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**South Carolina
Department of Natural Resources
Annual Report
1996-97**



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South Carolina
Department of Natural Resources
PO Box 167
Columbia, SC 29202

South Carolina Department of Natural Resources



James A. Timmerman, Jr.
Director

South Carolina Natural Resources Board
Columbia, South Carolina

Gentlemen:

Attached hereto is the Annual Report of the Department of Natural Resources.

The report contains a summary of the activities and accomplishments of the Department of Natural Resources and each of its Divisions. More detailed information is available from each division on these activities.

We look forward to working with you during this next year.

Respectfully submitted,

A handwritten signature in black ink, reading "James A. Timmerman, Jr.", written in a cursive style.

James A. Timmerman, Jr.
Director

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State of South Carolina

The Honorable David Beasley, Governor

South Carolina Natural Resources Board



Dr. George G. Graham
Chairman
Spartanburg

Thomas W. Miller
Vice Chairman
Anderson

Marion Burnside
Hopkins

Campbell D. Coxe
Darlington

Edwin L. Oxner
Florence

Mary Pope M. H. Waring
Charleston

Edward C. Lee
Columbia

FISCAL YEAR
July 1, 1996- June 30, 1997

**SOUTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES**

Dr. James A. Timmerman, Director Columbia

Larry Cartee, Assistant Director Columbia

John B. Reeves, Deputy Director
Administrative Services Columbia

Prescott S. Baines, Deputy Director
Division of Conservation Education
and Communications Columbia

Dr. C. W. Clendenin, State Geologist
Geological Survey Columbia

Cary D. Chamblee, Deputy Director
Land Resources and Conservation Districts Columbia

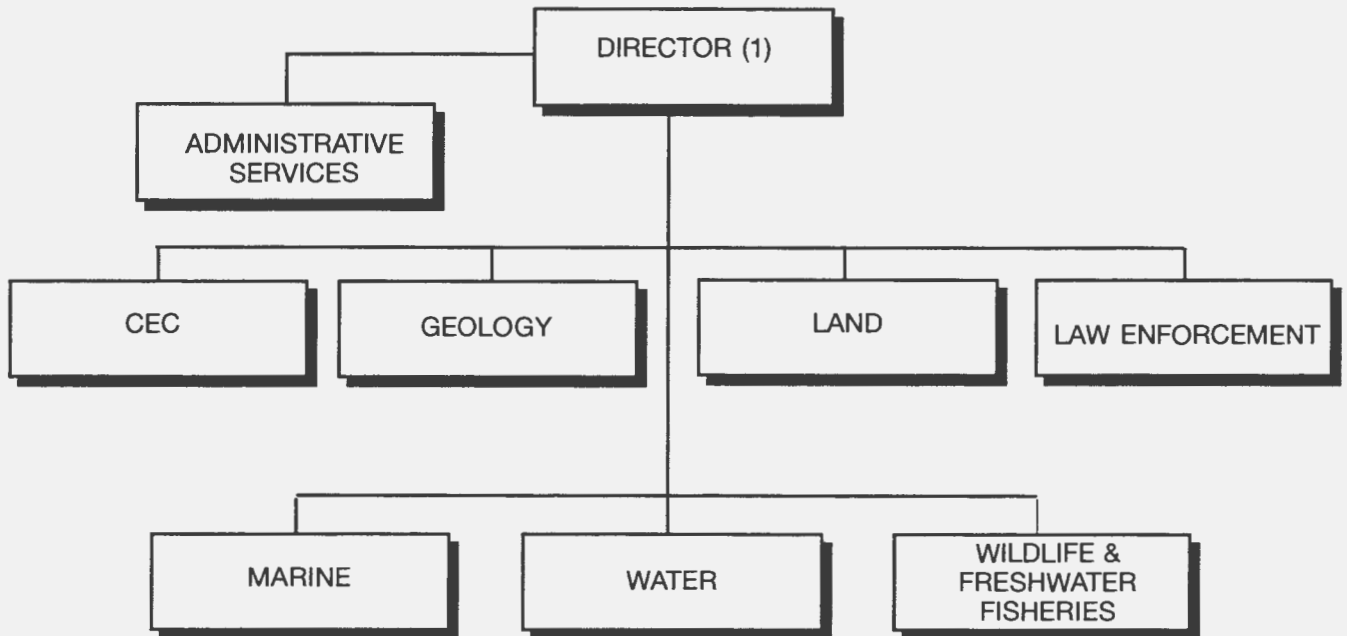
Mark W. Huguley, Deputy Director
Division of Law Enforcement Columbia

Dr. Paul A. Sandifer, Deputy Director
Division of Marine Resources Charleston

Alfred H. Vang, Deputy Director
Water Resources Columbia

W. Brock Conrad Jr., Deputy Director
Division of Wildlife and Freshwater Fisheries Columbia

South Carolina Department of Natural Resources



DIVISION OF ADMINISTRATION AND SUPPORT

Overall supervision for the South Carolina Department of Natural Resources is provided by the Director. He is appointed by the South Carolina Department of Natural Resources Board and is responsible to them.

Policy for the operation of the Department is set by the Board, which is composed of seven members, one from each congressional district and one at-large, appointed by the Governor, with the advice and consent of the Senate.

The Division of Administrative Services provides administrative support for the entire Department. This support comes through the division's accounting, procurement, information technology, supply and equipment, title and registration, and construction units.

Administrative Services is responsible for the administration of all funds as required by law. These include federal, state, and other revenues. This division is also accountable for inventory and all fixed assets, construction and repairs, land owned or leased by the Department, and the sale of hunting/fishing licenses, fees, fines and permits.

The Division of Administrative Services also provides budget expertise by identifying the financial needs of the Department to the Legislature through the annual budget process. Assistance is also given to the Executive Office for special assignments and policy reviews as needed.

FISCAL REPORT
Source of Funding for Expenditures by Program
FY 1997

	Appropriation	Other	Total
Administration/Support	2,521,510	1,547,562	4,069,072
Conservation Education and Communications	1,385,463	879,699	2,265,162
Titling and Registration	0	962,254	962,254
Game	187,563	6,713,941	6,901,504
Fish	421,914	3,248,206	3,670,120
Law Enforcement	6,933,351	6,204,863	13,138,214
Boating Safety	0	1,910,246	1,910,246
Marine Resources	5,202,038	5,189,335	10,391,373
Heritage Trust	611,404	556,295	1,167,699
Water Resources	2,812,823	1,750,332	4,563,155
Land Resources	2,134,148	769,931	2,904,079
Geological/Geodetic	308,194	116,364	424,558
Employer Contributions	4,380,083	3,317,122	7,697,205
TOTAL	26,898,491	33,166,150	60,064,641

STATUS OF FEES COLLECTED BY LICENSE DIVISION

July 1996 through June 1997

NUMBER SOLD	TYPE OF LICENSE	PRICE	DEPOSITED
10,066	(01) STATE HUNTING LICENSE	11.00	110,726.00
3,262	(02) COUNTY HUNTING LICENSE	4.00	13,048.00
117,488	(03) COMBINATION FISH & HUNT	16.00	1,879,808.00
49,326	(09) SPORTSMAN LICENSE	43.00	2,121,018.00
3,327	(11) JUNIOR SPORTSMAN	15.00	49,905.00
4,519	(07) RES. BIG GAME PERMIT	5.00	22,595.00
4,203	(17) RES. WMA PERMIT	29.50	123,988.00
15,788	(12) ANNUAL NON RES HUNT LIC	73.00	1,152,524.00
9,982	(13) 3-DAY NON RES HUNT LIC	24.00	239,568.00
1,967	(05) 10-DAY NON RES HUNT LIC	48.00	94,416.00
20,782	(06) NON RES BIG GAME PERMIT	79.00	1,641,778.00
3,890	(20) NON RES WMA PERMIT	75.00	291,750.00
3,512	(16) SHOOTING PRESERVE LIC	8.00	28,096.00
22,448	(08) DUCK STAMPS (HUNTER)	5.00	112,240.00
197,908	(04) STATE FISHING LICENSE	9.00	1,781,172.00
38,460	(18) 14-DAY RES FISH LICENSE	4.00	153,890.00
6,508	(19) LAKES & RESERVOIR PERMIT	2.00	13,016.00
17,468	(14) ANNUAL NON RES FISH LIC	34.00	593,912.00
66,970	(15) 7-DAY NON RES FISH LIC	10.00	<u>669,700.00</u>
			11,093,108.50

AMOUNT COLLECTED SAME PERIOD 1996 10,784,452.00

7,788	DUCK STAMPS (COLLECTOR)	5.50	42,834.00
3,982	SALTWATER STAMPS (COLLECTOR)	5.50	21,901.00
87,470	SALTWATER STAMPS (FISHERMEN)	5.00	442,350.00

STATUS OF CHARTER VESSEL, RENTAL BOATS AND FISHING PIER PERMITS

168	CV MAX 6 ANGLERS	150.00	25,200.00
13	CV MAX 49 ANGLERS	250.00	3,250.00
15	CV UNLIMITED ANGLERS	350.00	5,250.00
46	RENTAL BOATS	40.00	1,840.00
10	FISHING PIERS	350.00	<u>3,500.00</u>
			39,040.00

LIFETIME LICENSE SALES PLUS INTEREST 5-1-90 TO DATE 821,374.00

DIVISION OF CONSERVATION EDUCATION AND COMMUNICATIONS

Conservation Education and Communications Advisory Committee

Marion Burnside, Chairman	Hopkins
A. Pinckney Skinner, III	Florence
Carolyn Fair Randolph	Columbia
Robert E. Livingston, III	Newberry
Charles L. Wyrick, Jr.	Charleston
William R. "Buddy" Jennings	Chapin
Lorraine R. Conrad	Columbia
Jessie D. McCollough	Kingstree

The Division of Conservation Education and Communications (CEC) with offices in Columbia and Charleston is staffed by 37 full-time personnel supporting all divisions and programs of the S.C. Department of Natural Resources. The division's goal is to assure that information and education efforts are the result of proper planning and coordination, keeping in mind the needs of public, agency goals, cost-effectiveness, thorough review, accuracy and professional standards.

CEC provides the following agency-wide services: conservation education, Hooked On Fishing Not On Drugs program coordination, publication advisement, coordination and design, art and graphics, duplicating services, agency mail room, *South Carolina Wildlife* magazine production, marketing and fulfillment, magazine product marketing, still photography, RESPECT outdoor ethics campaign, agency news releases, weekly fishing trend reports, news media assistance, spokesperson services, video production (training, documentary, public service announcements), video library (free loan in-state), writing and editing, *S.C. Natural Resources* newspaper, and freshwater fishing records.

"HOOKED ON FISHING NOT ON DRUGS" PROGRAM

The "Hooked on Fishing Not on Drugs" (HOFNOD) program offers a sound purpose and a strong environmental message. Participating in this program offers South Carolina's youth an opportunity to experience an education in natural resources and an alternative to drug use.

Funding and distribution of promotional items is coordinated through the Conservation Education and Communications' administrative office. In February 1996, the Harry Hampton Memorial Wildlife Fund Board of Directors approved the allocation of \$4,392 for the HOFNOD program. These funds were used to purchase promotional items for rodeos being held in eight of the South Carolina Department of Natural Resources' law enforcement districts. An additional \$1,000 was allocated to each law enforcement district to help in operational costs. Seventeen department-sponsored rodeos were held throughout the state. The department co-sponsored with other state agencies and outside organizations approximately 15 other fishing events, lending assistance in manpower, coordination and promotional items. Promotional items were also used to assist law enforcement and education staff in promoting the HOFNOD program at schools and other outside organizations. These rodeos and other events helped to reach over 25,000 young people and adults with the HOFNOD message during 1996.

Department staff continue to seek other funding sources through state and federal grants.

EDUCATION SECTION

The Education section plans, directs, and coordinates comprehensive natural resource education programs, which teach ecological principles of our natural resources to the citizens of South Carolina. These programs have received awards on both the national and state level for their effectiveness and efficiency. Evaluation and personal service to teachers, families, and

other individuals who work with youth are the essence of the conservation programs. The following programs are administered by this division:

Project WILD-Project WILD is a national award-winning interdisciplinary environmental and conservation education program of instructional workshops and supplementary curriculum materials for teachers of K-12. Each participant receives the Project WILD Activity Guide which contains over 100 activities. Workshops are six hours in length with a minimum of 15 participants. There is no charge for the program. In the 1996-97 school year, staff conducted approximately 80 Project WILD workshops with over 2000 participants. Over 24,500 teachers have attended workshops since 1984.

Aquatic WILD-A continuation of the Project WILD program, Aquatic WILD emphasizes aquatic wildlife and aquatic ecosystems. Each participant receives the Aquatic WILD Activity Guide with over 40 activities. Workshops are four hours in length with a minimum of 15 participants. There is no charge for the program. In the 1996-97 school year, staff conducted 10 Aquatic WILD workshops with over 210 participants.

Conservation Education Programs-Designed to introduce students to the Department of Natural Resources, this program involves the use of live animals and enhance any curriculum. There is a \$30 charge for these programs. This program is very popular and staff cannot meet all of the requests received. Conservation Education Programs reached over 80,000 persons and could easily reach over 100,000 with additional staff .

Camp Wildwood-Camp Wildwood is designed for high school students who enjoy being out-of-doors and strives to increase their knowledge and experience in natural resources management. Located at Kings Mountain State Park about fifteen miles northeast of York, SC, Camp Wildwood is open to all tenth (must have completed ninth grade prior to camp) through twelfth grade high school students. Enrollment is limited to one-hundred campers. A camper may enroll through sponsorship by a local chapter of the South Carolina Garden Club and The South Carolina Wildlife Federation. A camper may also self-enroll if the parent or guardian so chooses. Sponsorship usually includes payment of the camp fee by the sponsoring organization. In addition, a limited number of scholarships are available from both organizations at the state level. Camp Wildwood is reaching 130 campers participating per year.

Whale Program-This program uses math, art, language arts and other subjects to introduce students to whales. Instructor provides information on whales and helps students construct a Blue Whale to scale. Cost of construction averages \$150. There is a \$30 charge for student groups, no charge for teacher groups. The Whale Program is reaching 1000 participants per year.

KATE-Designed for students in grades fifth through eighth. KATE provides a true comprehensive education camping program that is changing the way they think about the environment. This is accomplished through camps (three days, two nights) at two locations within the state. This program has already reached over 10,000 children in just four short years. The South Carolina Department of Natural Resources is a coalition member who supports the program financially, trains staff and serves by representation on the advisory board.

Junior Duck Stamp Contest-The South Carolina Department of Natural Resources and the Southeastern Wildlife Exposition sponsors the Junior Duck Stamp contest annually. This contest enables students grades K-12 to express their feelings of natural resources through art, however, the drawings are limited to ducks, geese, or swans. This conservation education contest goes on to compete nationally with other local winners from differing areas, and from that competition a winning entry will be selected to be transformed from a drawing to a stamp.

SC MAPS-An innovative curriculum that covers issues dealing with South Carolina's geological foundation, historical events, folklore, storytelling, mathematical skills, environmental concerns, and cultural development through the use of maps. This program enables students to learn

visually as well as interactively with familiar land around them. SC MAPS has been adopted by the DNR Division Directors as a Department Education Program as well as having continued support by the Department of Education. Staff training has been conducted and workshops for the 1996-1997 school year have trained over 300 teachers. A brochure has been created and an exhibit is being planned.

NEWS AND MEDIA SERVICES SECTION

PURPOSE: News and Media Services Programs within the Conservation Education and Communications Division provide overall news media, audio and video production services to all divisions of the agency and its cooperative projects with other government agencies, public utilities, organizations and private companies. It serves the public through timely and widespread dissemination of needed information, and images.

Through news releases; video and audio productions; and the Internet, News and Media Services Programs' purposes are to:

- Inform and educate the public about the condition and value of South Carolina's natural resources;
- Provide a primary spokesman for office and field operations covering the agency as a whole;
- Plan and coordinate agencywide public relations, employee Awareness training and media relations training;
 - Encourage ethical and safe conduct afield among outdoors enthusiasts;
 - Inform constituents of agency services, application deadlines and points of delivery;
 - Provide information on outdoor recreational opportunities;
 - Inform constituents of meetings, pending department actions and opportunities for public input; and
- Update the public on state and federal laws and regulations.

STAFFING: News and Media Services Programs includes a staff of 8 in two offices in Columbia (headquarters) and Charleston. The agency spokesman and news editor are in this group. Services are provided agencywide in news writing; television and radio production; news media coordination; video production; script and speech writing; production of the agency newspaper; staff orientation; delivery of public statements; and allied areas in support of all divisions and responses to inquiries from the public and the news media.

AGENCYWIDE SUPPORT: Staff covers all Natural Resources Board meetings and other meeting as needed to provide liaison with the news media. The Myrtle Beach Sun-News (41,195 daily circulation) published a special hunting and fishing section Thursday, Sept. 26, 1996, which contained 15 DNR news releases and featured the 1996-97 regulations brochure, DNR Citizen's Guide, the 1996-97 Migratory Waterfowl Stamp and a listing of all DNR license fees. Staff worked with the DNR executive office in November 1996 to get out immediate news releases on the Santee Coastal Reserve statement and the McClellanville boat ramp decision. Section staff wrote the new "Citizen's Guide to SCDNR Services" and assisted with "SCDNR Assistance Manual," which were printed in July 1996. Staff wrote Emergency Preparedness Plan for CEC Division as part of overall DNR Plan. CEC Division Emergency Preparedness Plan was revised in January 1997. Staff weekly updated news release Cross Reference books (organized by division) and Resources newspaper mailing list (by requests). Staff edited DNR education programs and Citizen's Guide for DNR Internet page and facilitated posting of regulations on Internet. Staff helped plan a Dec. 9 retirement luncheon and recognition activities for veteran section news writer Bob Campbell in Charleston. A productive news retreat was conducted Jan. 23-24 at

Donnelley Wildlife Management Area with participants including Mike Creel, Mike Willis, John Lucas, Glenn Gardner, Beth Mason, Cindy Thompson, Greg Lucas, Glen Connelly and Sharon Wright. Primary retreat aims were to plan a regional system of personal media contacts, conduct news writing training, discuss ongoing and future projects, and develop a recommendation for Natural Resources newspaper. Staff worked with Jack Horan of Charlotte Observer on resources and contacts for a new outdoor page to focus on non-consumptive activities. The section chief made contact with Dan Johnson, new editor of the Barnwell People-Sentinel, and Bob Bender of the Hilton Head Island Packet about his Thursday outdoor page. Staff worked with Governor's office and Comptroller General on creating a report on economics of natural resources conservation, but the project was canceled due to costs. Section staff assisted with preparations for Director's retirement function in May. Staff completed Association for Conservation Information annual contest entries in May for news, video and radio categories.

SOUTH CAROLINA WILDLIFE SUPPORT: Section staff provided editorial, research and photographic assistance to *South Carolina Wildlife* magazine through writing of feature, At Your Service, and Roundtable articles and coordinating with other agency divisions. News Staff wrote and provided photos for a 1,700 word section on planting for birds in the Palmetto Portraits calendar and updated the freshwater fish records section of the Sportsman's Calendar. A feature article on South Carolina's first hunters - the Paleoindians - was completed in June 1997 for *South Carolina Wildlife* magazine. Section staff assisted the Magazine Section with pre-holiday December 1996 byproduct sales. Four Section writers attended Oct. 26 SC Wildlife Field Editors meeting. Staff wrote a *South Carolina Wildlife* Roundtable article on Outdoor Classrooms. News staff wrote an At Your Service article on Chip Berry in Land Resources. Section staff researched and wrote *South Carolina Wildlife* magazine articles on Reedy River oil spill; At Your Service article on Marine Resources employee and shrimp baiting feature. Staff assisted editor John Davis on the Marine Resources Division 25th anniversary article. Photos were researched in May for *South Carolina Wildlife* magazine story on MRD 25th anniversary. A presentation was made by news staff on behalf of the agency and *South Carolina Wildlife* to the S.C. Native Plant Society's First Annual Symposium May 24 at Clemson.

DEPARTMENT NEWSPAPER: S.C. Natural Resources newspaper, formerly *The Resource*, has been mailed free to state residents annually or semiannually since 1979. From a retreat of News and Media Services staff a proposal was developed in February 1997 to redesign Natural Resources newspaper from a 40-page once-yearly publication (70,000 copies printed, 65,000 mailed) costing \$24,000 to four 24-page quarterly issues (25,000 printed, 10,000 mailed) costing \$21,000. New Design for Resources newspaper was approved by the CEC Deputy Director for presentation at the July Deputy Director's meeting. The 1996 annual issue of the agency newspaper was mailed Nov. 25, 1996, at a cost of \$24,101.53 to print and mail. A total of 70,000 were printed, 65,000 were mailed to state residents (8,000 requestors plus two types of lifetime license holders, Project WILD teachers and the remainder filled with holders of Sportsmen's licenses and saltwater fishing stamps.). The remaining 5,000 copies were distributed by the agency during presentations and exhibits like the Palmetto Sportsmen's Classic, State Fair and other events. This proposal for a smaller, quarterly publication was intended to give Natural Resources newspaper new vitality and help its preparation dovetail better with priorities and staffing. The new paper would have fewer pages, reduced from 40 to 24 pages. It would be published quarterly (four times a year) rather than annually. Only 25,000 copies would be printed, and a distribution plan developed to get a supply to DNR offices and major events. It would be mailed to a smaller constituent audience (currently a growing core list of about 10,000 who requested it). The paper would then grow from requests by residents who pick up a copy distributed by department staff during meetings, presentations or exhibits or who read a newspaper sent to someone on the mailing list.

NEWS RELEASES: The news release program provides a timely means of communication with print and electronic news media covering South Carolina; with the department's field staff, particularly natural resources officers; other state, regional and federal conservation agencies; and the state's conservation organizations. .

Weekly News Package: A total of 299 statewide and regional news releases and media notices were published during FY 1996-97 with a weekly distribution list of 750 (in-house and outside of agency via e-mail, fax and mail). The weekly package of prioritized articles, freshwater and saltwater fishing trends and state tidetable is sent to 22 daily newspapers; 115 non-dailies; 103 radio stations; 29 television stations; 28 magazines; 3 news services; 15 feature writers; 11 outdoor writers; DNR staff, enforcement officers, all board and advisory committee members; 34 conservation groups; and 12 PRT Welcome Centers.

News Cost Savings: Reducing the costs of materials, operation and production, while maintaining quality and effectiveness, is an ongoing effort of News and Media Services. Mailing lists for news releases and the department newspaper are updated and monitored weekly. The weekly news release package is printed in-house using both paper surfaces with a two-page article length limit and an overall size limit of nine sheets to limit production costs. A one-page summary is sent to most radio and television station news directors. Photographs are mailed to individual media only as requested. As a result of a readership survey this year, E-mail distribution of the weekly news release is growing with the aim of reaching all in-house readers and as many media and other destinations as possible

News Via Modem, E-Mail and Internet: The news package is formatted weekly for DNR's Internet Home Page. To make department news and information more accessible to the public while limiting costs, existing telephone lines and computers are used to publish news releases and fishing reports on the Internet via the agency's World Wide Web home page in the Water Resources Division. News releases are also sent weekly by direct modem transfer to nine major daily news papers - The State, The Greenville News, the Anderson Independent-Mail, The (Rock Hill) Herald-Journal, The (Myrtle Beach) Sun-News, The (Spartanburg) Herald-Journal, The (Orangeburg) Times and Democrat, and The (Charleston) Post-Courier. A one-page news summary is modemed to Associated Press headquarters in Columbia in addition to inland and marine fishing reports which are relayed to all subscribing media. WIS-TV publishes the fishing trends report as a regular feature on the Saturday 9 a.m. news show. Most of the state's newspapers feature the reports weekly.

Weekly News Release: DNR began its first true e-Mail transfer of news in August 1996 to S.C. Out-Of-Doors, monthly publication of the S.C. Wildlife Federation. A successful mailing test of a redesigned, self-covered news release package was carried out as part of a plan reduce costs and handling. A survey of news release recipients was completed for mailing on April 7 to update addresses and contacts; reduce mailing list size and identify e-mail and modem addresses. Jim Matthews of National Outdoor News Service and Pete Iacobelli of Associated Press were added in June 1997 to WEEKLYNEWS, our e-mail list news release recipients. The modem connection for Spartanburg Herald was updated in June to their new high speed, toll-free line, making Anderson, Charleston and Spartanburg all toll-free transmissions or the weekly news release. Modem communication with The State newspaper was revised in January 1997 to match their new Windows-based network. A comprehensive readership survey was mailed in April to news release recipients with the intent of reducing costs and man-hours by encouraging access to news releases via DNR's Internet home page, e-mail or other means. News Section chief talked with John Brasier of Myrtle Beach Sun News in May to encourage use of weekly modem news and established a good contact. In May Earl Shelsby of Outdoor News Network on the Internet, S.C. Wildlife Federation and coastal fishing writer Don Millus were added as weekly e-mail recipients of the news release package, a new feature of the news program The

weekly fishing report was redesigned in June 1997 for easier editing and multiple use on the DNR Internet Home page and other publication opportunities. The News Office fax was reprogrammed with broadcast groups for daily papers, nondaily papers, modem transmit notice; in-state television, Georgia television and North Carolina television. In June 1997 preparations were made to implement a new, cost and time saving news release which uses a self cover and postal permit, saving the costs and time spent stuffing envelopes.

SCDNR HOME PAGE: News staff worked with the Water Resources Division in expanding and improving the department's Internet home page. Current news releases, fishing reports, tidetables and other information were edited and formatted weekly for home page use. Staff met with Jim Scurry, Floyd Stayner and Chris Page in August 1996 at Water Resources to better coordinate and update information on DNR home page. For DNR Internet home page staff updated shrimp baiting season dates and listing of DNR education programs. With assistance from Graphics Section the first news photos (record white bass and shellcracker) were loaded in April onto DNR's home page.

VIDEO PRODUCTION: The video unit provides cost-effective in-house production of public service announcements, promotional videos of department activities, natural resource documentaries, and staff training videos. Staff support video/audio needs of agency functions such as meetings, workshops and media training sessions. An archive of video images is maintained for both DNR productions and outside productions that are DNR related and nonprofit.

Video Library: A video/film library is maintained offering a list of department productions on free loan to the public, agency staff, organizations, and other state agencies. Each law enforcement district office and some wildlife field offices have been provided a set of library videos. A duplicate set of department films and videos is available on free loan to teachers from the Audiovisual Library of the S.C. Department of Education in Columbia and updated as needed.

Television Public Service Announcements: During FY 1996-97, television PSAs were produced on:

- Free Fishing Days;
- Take One, Make One;
- Palmetto Sportsman's Classic; and
- Florence "Hooked On Fishing Not On Drugs" youth fishing Rodeo.

Training, Educational and Documentary Videos: The following video projects were completed:

- impact of the Reedy River fish kill;
- Becoming an Outdoors-Woman;
- acquisition of Sandy Island as a mitigation bank;
- Camp Wildwood camper's video;
- updated version of the pumpback turbines at Russell dam;
- classroom scenes showing SCMAPS in use as part of an ETV interactive broadcast;
- descriptive tour of the MRD/Harry Hampton-funded lobby displays;
- DNR-sponsored youth deer and duck hunts;
- videos for the Marine Resources Center 25th anniversary and a MRD division overview;
- new Boater Education instructional series to support the new boating safety law.

Video Projects begun, Dedications & other activities: The video unit started work on several videos that were finished after the start of FY 98 or are still being shot. These include: Jocassee Gorges; mountain trout fishery; DNR-managed state lakes; warmwater streams of the Southeast; S. C. Envirothon; and the Land Resources Conservation Camp. The most notable dedications that were videotaped were the Walhalla State Fish Hatchery and the Secessionville Heritage Trust acquisition. The scope of the full productions limited the time available for general field shoots, but the following people and places were added to the DNR video archives to be used

as needed: river canoeists, youth hunters, fisherman on Lakes Wateree and Murray, mountain scenics and backyard birds. The monumental task of electronically archiving the entire DNR library with new SceneStealer software was also begun.

National Hunter Safety Video Public Service Announcement - Staff assisted the U.S. Fish and Wildlife Service in editing, compiling television station lists and providing video for a nationally distributed hunter safety public service announcement, localized with each state's point of contact.

ASSISTANCE BY DIVISION OR PROGRAM AREA:

Support of Administrative Services: Worked with Linda Amick to develop news releases to publicize a new law on disability licenses. Staff worked with Linda Amick in Licensing in January to get Free Fishing Days through the year 2000 approved by Dr. Timmerman. The section chief made personal visits March 12 to Sumter Daily Item and Orangeburg Times & Democrat and met with editors about SCDNR's weekly news release and their outdoor news schedule.

Support of Marine Resources: Saturation advance news coverage was planned for the public forum series on the marine laws rewrite, aiming for best possible attendance through personal contact, e-mail, modem, fax, radio and pre-meeting appearances by marine staff on local tv stations. Charleston staff met several times with the Marine Center's 25th Anniversary Committee and chaired meetings of the History and Photo Sub-committee. Staff helped set up and man 1997 Southeastern Wildlife Expo displays for Marine Resources Division and coastal Focus Areas. Photo support was provided for Ft. Johnson Initiative. Staff prepared drafts for two new publications: Care, and Handling of SC Seafood and Diseases Affecting Seafood Products; and Proper Techniques to Release Saltwater Fish. Several files of research were provided for the Marine Center's 25th anniversary book and a Commerce Magazine article on the economic impact of natural resources recreation. Staff researched and wrote a special publication in March on proper release of saltwater fish. News staff created and installed anew History of Ft. Johnson display in Marine Resources Research Institute lobby in May worked with MRD staff to construct and install new light box displays in Marine Resources Research Institute auditorium. News staff assumed responsibility for writing and production of MRD History Publication in May.

Wildlife and Freshwater Fisheries Support: Staff coordinated with Greenville news media on Reedy River oil spill and DNR response. We helped Small Game Program update public dove fields list for cost savings in printing and multipurpose use including posting on the DNR Internet home page. Staff assisted Myrtle Beach Sun Times reporter with story on fish kills after Hurricane Fran. We acquired National Hunting and Fishing Day proclamation from Governor's office and faxed it to National Hunting and Fishing Day headquarters and published a news release with camera ready logos available. Staff developed, wrote and published the seventh annual Wildlife Diversity News package in December 1996 to take advantage of the typically quiet holiday news season and promote the department's Wildlife Diversity and Heritage Trust activities. Staff worked with Tim Smith of the Greenville News capitol bureau for an article on the Endangered Wildlife Fund, South Carolina's first charity to appear on state income tax forms. News staff worked with Wildlife Diversity, S.C. Center for Birds of Prey, Law Enforcement and the department spokesman to publicize and plan a news conference on an illegal eagle shooting at Lake Hartwell. Staff attended the Duke-DNR partnership meeting in July 1996 with Freshwater Fisheries to prepare "white paper" from resulting discussion. Staff received an update on national public relations plan for Wildlife Diversity Funding Initiative and met with Billy McTeer and Tom Kohlsaat to discuss what steps should be taken in S.C. Presentations in October 1996 were on native plant conservation and heritage preserves to three regional "wildflower explosion" workshops in Greenville, St. Matthews and Columbia in cooperation with S.C. Garden Clubs and Clemson University Extension Service. News and Media Services staff worked with the department

spokesman, Duke Power and the Governor's Office to plan the Governor's Jan. 31 Jocassee Gorges media conference. Staff wrote a news release on the Jocassee/Keowee fisheries agreement with Duke Power in January and helped coordinate a presentation by Freshwater Fisheries to Duke at the January Natural Resources Board meeting. Staff worked with the Camden Chronicle to get special coverage for the DNR-sponsored Bowater youth deer hunt. Provided photo and news coverage of the Jan 25 Bear Island Adult-Youth Duck Hunt. Staff provided news and photo coverage for Jr. Duck Stamp Project at Donnelley WMA in February. Media coverage was coordinated for the McKinnon Heritage Preserve dedication in March in Hartsville getting onsite coverage from three papers and two television stations. Staff worked with Jack Horan of Charlotte Observer during March on resources and contacts for a new outdoor page to focus on non-consumptive activities. Section staff in April handled many media calls (including ones from Charles Salter, Atlanta Constitution fishing editor, and TV angler Orlando Wilson) about a hoax world's record South Carolina largemouth. Staff assisted Pat Robertson with research in April to justify an expanded Outdoors page in The State newspaper; worked with Duke Power on news release about building footbridge (April 22) at Salem tree nursery for upcoming HOFNOD youth fishing rodeo; assisted WSPA-TV in Spartanburg with background on Lake John D. Long for the story about removing the boat ramp; helped Anderson Independent-Mail on story about footbridge over Tamassee Creek; and provided Carolina bay photos to Charlotte Observer to accompany article on Woods Bay and other Carolina bays. Laura Tiesl of the American Sportfishing Association in April was provided with details of how we promote sportfishing. Staff worked with Fisheries and Legal sections in May to publicize pumpback turbine problems at Lake Russell. Staff assisted Charlotte Observer with information in May on rare plants for Jocassee Gorges article; worked with Duke Power on news release for Tamassee Creek "Hooked On Fishing, Not On Drugs" rodeo; and worked with the University of South Carolina, and Savannah River Ecology Laboratory for news release on departing Heritage board members. Staff worked on publicity plan in May for Harvest Information Program (HIP) for Linda Amick and John Frampton. Staff coordinated media coverage of June 27 Walhalla State Fish Hatchery dedication, and also worked with Val Nash beforehand on program, speakers, plaque inscriptions and other planning details. Media coordination was provided for June 16 Fort Lamar Heritage Preserve dedication in Charleston. Staff worked with legal and fisheries to get out fact sheets and news releases on demand about Richard B. Russell Project, keeping media up to date, including AP, The State, Augusta Chronicle, Greenville News and Greenwood Index-Journal.

Law Enforcement, Boater and Hunter Education Support: News staff worked with Michael Sponhauer of The State, Mike Willis, Caroline Agardy and Col. Mark Huguley regarding an article being researched on officer pay raises. Staff assisted Chris Chaffin of National Shooting Sports Foundation in August with photos of deer and turkey to appear in ads for National Hunting and Fishing Day. Staff met with Col. Huguley about publicizing dove baiting regulations via officers personally carrying a brief release to each non-daily newspaper and CEC handing dailies. We contacted every daily newspaper in the state by fax with a personal phone call follow up to ensure saturation coverage of new ban on top sowing of grain on dove fields. Staff scheduled a photo shoot for news release on 1996 Officers of Year, conducted interviews, coordinated publicity and sent articles and photos to regional and local newspapers. We contacted Georgia natural resources agency about their hunting and boating accident database, and discussed its usefulness in responding to media calls with Major Van McCarty and Col. Mark Huguley. Staff helped Tommy Braswell of the Charleston Post-Courier with research and interviews for an article on personal flotation devices. A regular series of news releases was begun in March on upcoming hunter and boater education courses and a plan was drafted to upgrade news coverage of hunter and boater education (sent as a memo to Natural Resources Enforcement Division). Staff worked with boater education in April to fully publicize May 6 implementation of the new law and

to publicize boater education classes and training opportunities through Division of Motor Vehicles offices statewide. At request of Col. Huguley media calls were handled in May about an officer arrested on "chopshop" and conspiracy charges. Staff worked with Lt. Glenn Ward and Col. Mark Huguley to prepare a news release about boating under the influence for July fourth holiday. Staff provided Robert Thompson of Rock Hill Herald and Kent Kines of Augusta Chronicle with boating safety releases on new laws and training. Staff gave Spartanburg Herald the story on June 30 recovery of drowning victim in Pacolet River. Staff assisted Teresa Hatchell of Orangeburg Times and Democrat with story on increase in boating fatalities.

Governor's Cup Billfishing Series Support: The News Section Chief researched newspaper coverage of the Governor's Cup Billfishing Series tournaments via Internet and the State Library by the major daily newspapers for 1996, 1995 and 1994, as well as department news release coverage and developed ways to upgrade coverage in coastal, as well as, upper state daily and non-daily newspapers. Plans included posting the governor's cup 1997 tournament series schedule prominently on DNR's Internet home page. Individual sports desks are contacted for their requirements in terms of copy, timing, format, etc. We also evaluated what news release timing after the tournament allows for thorough factual review and the best placement in their papers. The section chief talked with Tommy Braswell of the Charleston Post-Courier and Lee Harter of the Orangeburg Times & Democrat about Governor's Cup coverage and improved modemming procedures. The section chief and staff worked in April to plan for rapid modem transmission of Governor's Cup results via remote laptop computer to meet newspaper deadlines. Charleston news writer Pete Laurie was set up and trained with remote e-mail for weekend Governor's Cup media work. The plan was implemented in May for rapid modem, fax and e-mail distribution of Governor's Cup stories to Charleston Post-Courier, coastal papers and major dailies. Two Governor's Cup stories were sent to Post-Courier for next-day use.

ACE Basin Project Support: Charleston News Section staff worked with Dean Harrigal at Donnelley WMA to produce a new Focus Area display for use at the Southeastern Wildlife Exposition Feb 14-17. Staff edited and wrote copy, shot photos and assisted with design and layout of ACE Basin Current Events newsletter (Vol. 8, No. 1) to be published prior to Southeastern Wildlife Exposition. In April 1997 News Section staff researched an expanded "Driving the ACE" trail for inclusion in a new user's guide; provided photo support to the Shad Tagging project; assisted with field trip for 50 eighth-graders at Donnelley WMA; attended a SC PRT meeting to provide input on bird watching in coastal portion of the planned "Heritage Corridor." News staff assisted Jack Horan of The Charlotte Observer in December with a story dealing with the success of the ACE Basin Project. The coastal news writer was appointed in May to a committee chaired by Paul Sandifer to plan and develop a visitor center in ACE Basin. The coastal news writer wrote, edited copy and provided photo support for summer 1997 issue of ACE Basin newsletter.

Water, Land and Geology Support: News staff assisted the agency spokesman in media coordination of the July 31 Memorandum of Understanding between DNR, the USDA-NRCS and the state's Soil and Water conservation districts. We assisted Ned Barker of Channel 15 in Myrtle Beach in August 1996 about publicizing Beach Sweep/ River Sweep volunteer search. News staff met with Water Resources in November 1996 to discuss 1997 news plan and upcoming news releases and with Land Resources. An article and photos were completed on Bill Bowers of Pickens County, Conservation District Cooperator of the year to County for a DNR news article, Goodyear magazine (award sponsor) and Goodyear's Internet site. Staff worked with Water Resources to publicize cooperative effort to prevent shoreline erosion and improve fish habitat with native aquatic plants. Staff covered Land Resources Arbor Day activities in several conservation districts and educational workshops. Staff planned news coverage for the State Conservation Conference Jan. 2-4 in Charleston. Staff met with public information coordinator at USDA Land Resources Conservation Service to discuss joint publicity efforts for conservation

districts to avoid duplication of effort and is now in process of creating calendar of events to publicize. Staff attended an Earthquake Meeting in Charleston in February and worked with S.C. Emergency Preparedness Division to prepare and distribute news releases and press packet. Land Resources conservation award news releases and pictures were sent after the annual conference to area newspapers and conservation districts. Staff prepared text for the Youth Conservation Workshop brochure and worked with Graphics Section to produce brochure. Staff continued working with State Geologist in March on article about Otter Island (sediment measuring instrument) project. Staff assisted Water Resources to promote May 3 Lynches River Festival. Staff developed an Envirothon media packet in April for distribution first week in May; distributed the Lynches River Festival media packet and made follow-up calls. We worked with Keep America Beautiful on article about recycling efforts in Conservation Districts. Notices were faxed to area news media about May 20 Water Resources drill core education project at Clark Middle School in Orangeburg County, which received good coverage. Staff met with Water Resources in May to begin publicizing Rivers Month, Adopt-A-Landing and Beach/River Sweep. Staff assisted in publicizing DNR Internet capabilities. News Section staff assisted in promoting Rivers Month, Farm Safety Day in Orangeburg and DNR Land Protection Conference in June 1997. Staff met with DHEC and Land Resources to plan 1998 SC Nonpoint Source Pollution conference.

Public Awareness Committee Activities, Media Training & Education Support: Assisted with division coordinator training Aug. 21 and 28 in news and video processes. Made presentation on section services at Oct. 30 agency-wide Awareness training. Two staff attended presentation skills workshop. Two staff members organized a 5K run/walk as part of the Palmetto Sportsmen's Classic. Staff sent a package of materials to selected newspaper writers statewide on SCMAPS Teleconference and program in February. Staff manned booth for Palmetto Sportsmen's Classic 5K run/walk at the Carolina Marathon Expo Feb. 7 and 8 and obtained services of local potter to do 5K awards. Staff assisted with Outdoor Classroom project in May in Kershaw County. Staff attended a Project Learning Tree workshop in June for news research. Section member passed step test from S.C. Forestry Commission with superior rating for fire crew certification.

DEPARTMENT SPOKESMAN: Throughout the fiscal year the Executive Assistant for Media Services, also called the department spokesman, served as a primary contact for the agency, regularly responding to news media inquiries regarding law enforcement operations, drownings, searches, hunting accidents, boating accidents and other matters. This position also coordinates media relations training for staff likely to be interviewed by news media and employee orientation sessions. Media support was provided to Marine Resources Division in July during the Taura Shrimp Virus outbreak. Media training seminars were held July 15 in Charleston and Sept. 27 in Columbia. Onsite radio coverage was provided to all Governor's Cup Billfish tournaments. During the approach and landfall of Hurricane Bertha (July 9-12) and Hurricane Fran (Sept. 3-6) the spokesman worked with the State Emergency Preparedness Division and Governor's Office. This position chairs the agency Awareness Committee and coordinates staffing for the State Fair exhibit and other agency-wide exhibits. An Awareness Committee Retreat was held Nov. 7 with all divisions represented and an annual DNR marketing plan and budget discussed. A Jocassee Gorges news conference was planned for Nov. 13. The department's second Awareness Training Workshop for employees was held Oct. 30 with 135 DNR employees participating. The spokesman met with public information officers on several occasions for coordination. A news conference was held Dec. 18 at Lake Hartwell to announce a \$5,000 reward for information on the shooters of a bald eagle in November. The spokesman worked over a long period with the Governor's Office, DNR Executive Office and Duke Power to plan a Jocassee Gorges news conference and Governor's tour on Jan. 31. The DNR exhibit was put up and manned Jan. 16-19 at the Myrtle Beach Wildlife Expo. The spokesman coordinated publicity and advertising for the March 21-23 Palmetto Sportsman's Classic and served as PA announcer. In March information

was compiled and stories release on the location and recovery of the Winyah Rescue plane that crashed off Charleston in December. DNR's annual Public Awareness plan was presented to deputy directions and approved. A 30-minute public affairs program on the Watercraft Safety Act and boating safety was produced and aired Sunday April 20 on the Breeze Radio Network. A news conference was held May 16 at Lake Murray to promote boating safety and the new Boating Safety Action Force (BSAF) unit in DNR law enforcement. Live interviews were conducted during May and June every Friday at 7:50 am on WCTG AM 840 radio in Columbia. The spokesman served as emcee for the May 17 Envirothon at Clemson University's Sandhills Research facility and for Dr. Timmerman's retirement function May 28. During June 1997 special attention was given to multiple boating accidents with fatalities, bear sightings, nuisance alligator calls, Reedy River Spill environmental assessment and temporary no wake zones in Bohicket Creek. Photos and a story on buoy replacement at the Lake Murray Dam swimming area were published in the July edition of Lake Murray Magazine. S.C. Commerce magazine was sent supporting wildlife and scenic photos for an article on natural resources economics entitled South Carolina's Wild Side.

RADIO PUBLIC SERVICE ANNOUNCEMENTS: Radio announcements on compact discs containing 5 to 8 public service announcements were produced quarterly and distributed to every radio station in South Carolina.

- October-December topics included winter bird feeding, Christmas bird count, cold weather boating tips, recreational oyster harvesting, S.C. Wildlife Magazine, Christmas tree recycling, bat conservation, conservation districts, Lake Murray drawdown and aquatic weed control, alligators and hunter education.

- January-March topics included the Myrtle Beach Wildlife Expo, Palmetto Sportsmen's Classic, Watercraft Safety Act, Heritage Trust tax checkoff, Camp Wildwood, Severe Weather Awareness Week and Stewardship Development.

- April-June topics were the Watercraft Safety Act, National Flood Insurance program, Sportfishing Loaner program, Hurricane Season and safety, Free Fishing Days, S.C. Rivers Month and the Marine Resources 25th anniversary.

- July-September topics included the Watercraft Safety Act and boating safety, National Flood Insurance, Saltwater Fishing Stamp, Beach Sweep/River Sweep, Wildlife Restoration 60th Anniversary, and the Land Resources Information Center.

SOUTH CAROLINA NATURE VIEWING GUIDE: Staff has met on a regular basis with US Forest Service and CEC graphics and Magazine staff to discuss / work on Nature Viewing Guide project. News and Magazine staff have edited Nature Viewing Guide sections, and text has been forwarded to site managers for final approval. Photo selection is in its final stages. Guide should be printed no later than March 1997. Planning is underway for marketing the guide.

BECOMING AN OUTDOOR WOMAN: Three annual BOW workshops have been offered since 1995. Staff have been successful in getting top-notch instructors, numerous sponsors and a generous amount of media support. Plans are underway for the fourth annual workshop, and Beyond BOW day clinics are being planned, which will expand on classes taught at the three-day workshop. One such Beyond BOW clinic will focus on coastal recreational activities. Family-oriented day clinics are also being proposed. Past workshop participants have formed S.C.'s Outdoor Women's Network.

COOPERATIVE PROJECTS:

South Carolina Fishing Hotline and Weekly Fishing Reports: The 1-800-ASK-FISH toll-free fishing hotline - which started on Oct. 5, 1994 - had a third successful year. Updated weekly with the department's weekly fishing trend reports, the fishing hotline provided callers across the nation with valuable information about fishing opportunities in this state such as lake descriptions, frequently asked questions, license dealers, boat ramps, subscription details for South Carolina

Wildlife magazine and statewide Hooked On Fishing Not On Drugs fishing rodeo schedule. This highly successful federally funded hotline is sponsored by the department and the Sportfishing Promotion Council. Associated Press, which weekly sends DNR fishing reports to its subscribers, agreed to start advertising the 1-800 number in its reports. The State newspaper prints the report in its entirety in each Friday's Sports Section. WIS TV(Channel 10) in Columbia airs the department's weekly fishing report with the DNR logo during its Saturday 9 a.m. news show

Lexington Library Fishing Loaner Program: Staff continued promotion of the Lexington County Library fishing gear free loan program which began in March 1995 as a joint effort of the S. C. Department and local bass fishing clubs who maintain the equipment. Nine libraries currently loan out the tackle, and local BASS clubs repair and maintain the equipment.

State Parks Fishing Loaner Program: Staff promoted the state parks fishing loaner program, which began July 13, 1995. Ceremony to mark addition of eight more state parks was held at Dreher Island State Park and covered by several TV stations and newspapers. The cooperative fishing equipment free loan program available at 12 state parks is a joint effort of the S.C. Department of Parks, Recreation and Tourism, the S.C. Department of Natural Resources and local bass fishing clubs who maintain the equipment. This effort is also supported by the Sportfishing Promotion Council, Silstar Corp. and Shakespeare.

Freshwater Fishing Records: The section maintained and promoted the state's freshwater sportfishing bowfishing records programs informing the public of state record rules and verifying five new records.

- James Couch of Pickens reeled in a record breaking 3-pound, 4-ounce redeye bass Nov. 28, 1995, from Lake Jocassee while using a nightcrawler in about 20 feet of water. His record redeye wasn't recognized until July 1996 because his registration form was misplaced. Couch added another notch in his rod and reel on April 18, 1996 breaking the spotted bass state record with an 8-pound, 2-ounce fish, while fishing with live herring in Lake Jocassee.

- Johnny Gilliam of Columbia caught a record-breaking 5-pound, 4-ounce white bass, on Monday, March 17, from a section of the Broad River around Peak in Lexington County. Gilliam was fishing from the bank using a Shakespeare open face spinning reel, 17-pound -test line, a live minnow and split shot.

- Gerald Mishoe of North Charleston snagged a record-breaking 5-pound, 1-ounce redear sunfish, commonly called a shellcracker, on Sunday, March 30, from the Diversion Canal near Cross in Berkeley County. Mishoe used a live cricket; a 7-weight, eight-and-a-half-foot fly rod; and an ultralight Penn spinning reel in about 10 feet of water. This monstrous catch missed breaking the world record by only 2 ounces.

- Robert Bryan Young of Blythewood landed a 44-pound, 6-ounce carp while bowfishing Saturday, March 29 in Lake Murray near Chapin to set a new bowfishing record for carp. Young broke the current record by more than five pounds. The total length of Young's catch was 40 and a half inches with a girth of 33 and a quarter inches.

PRIORITY NEWS RELEASES FOR FISCAL YEAR 1996-97

July 96: Public Hunt Applications Being Accepted; Fee Increase Approved On WMA Hunts, Webb Center Quail Hunts Canceled, DNR seeks Comments During Blue Crab Meetings; Health Deer Herd Points To Future Record Bucks; State's Dry Conditions Bring Fireworks Caution; DNR Officers Assist With Hurricane Alert; Say Happy Birthday With A Lifetime License; Event-style Boating Facility Added To Lake Thurmond; Youth Conservation Workshop Opening Doors To The Future; Environmental Assessment Phase of Reedy River Oil Spill Underway; Youth Dove Hunts Planned In Upstate, Cooperative Agreement Renews Commitment To Conservation; Citizens Will Benefit From Aug. 9 Marine Banquet; Record Deer Harvest Reported in South Carolina; 12 Billfish Caught During Final Leg of Governor's Cup Series; Natural Resources Board Meets July 19 In Edisto Beach; DNR Enforcement Committee Meets July 17 Near Garnett.

August 96: Record Number of Hunters Brings Record Turkey Harvests; Greenville Reef Is Newest State offshore Fish Habitat; Youth Dove Hunt To Be Held Sept. 2 In McCormick County;;Governor Beasley Leads Signing of Historic Conservation Agreement; New State Climatologist (Dr. Michael Helfert) Named for South Carolina; 51 Public Dove Fields Available for Hunting; Dove Hunting Over Top Sown Grains No Longer Allowed in South Carolina; Maryland Artist Wins Saltwater Stamp Contest; Organization Finds South Carolina Wildlife Tops in Photo, Article Competition; Youth Dove Hunts to be Held Sept 2 in Union; Newberry Counties; Natural Resources Board Names Director Designee; Seining in the Surf Offered in ACE Basin Seminar Series; Reader Friendly Regulations A Natural Resources Tradition; and Beach Sweep/ River Sweep Organizers Seeking Volunteers.

September 96: Citizen's Guide Brochure Available; Shrimp Baiting Season Opens Sept. 13; Shellfish Season Opens Sept. 16; Waterfowlers Get More Goose Hunting; Pumpback Turbine Testing Bad News for Larval Fish; Marine Advisory Committee Looks at Blue Crab Fishery Sept. 19; S.C. Outdoors Woman Workshop Is Huge Success; National Hunting and Fishing Day Set For Sept. 28; State Celebrates Archeology Week Sept. 26 - Oct. 5; Cline Foundation Again Supports Hampton Wildlife Fund; Proper Disposal of Deer Remains Is a Rule of Good Hunter Ethics; S.C. Billfishers Win two-state Competition Second Year Running; Regional Rock Shrimp Rule Will Affect Local Shrimpers; etc.

October 96: Nuisance Wildlife Control Operators' List Available; Mentor Program Encourages S.C. Minority Students To Enter Marine Science; Deer Hunts for Disabled Hunters Held in Newberry County; DNR Recognizes Best Enforcement Officers; Federal Funding IS Essential to S.C. Wreckfishing Funding; "Robo-Deer" Helps DNR Officers to Curb Illegal Hunting; Prestigious Wildlife Award Presented to DNR Director; Top Quail and Rabbit Counties Named; November Elections Planned for District Commissioners; Marine Game Fish Program Reports Continued Success, Watch Your Manners On Public Hunting Land; "Envirothon" Challenges High School Students; Artificial Reef Honors Medal Winner, Marine Division Supports Hunley Project; etc.

November 96: Planting Shrub *Lespedeza* Improves habitat For Quail; Hunters Asked To Observe Safety Zones On WMA Lands; Recreational Boaters Free Of Radio Licensing Fees; Mountain Deer Study Underway in S.C.; Shrimp Baiting Season To Close on Nov. 12; Historical Edisto Walk Planned Nov. 16 As ACE Seminar; Winter Bird Feeding Workshop Set Nov. 16 At Sandhill Center; Upcoming Goose Hunt Shouldn't Be Confusing; Duck Season Near In S.C.; Tenth Annual Quail Management Seminars Scheduled For March; Changes in Seatrout Regulations Sought; Event-Style Boating Facility Added To Lake Thurmond; Native Plant Project To Enhance Lake Murray Shoreline; Orangeburg Man Appointed To Natural Resources Board; Special Regulations In Effect At Hatchery Waterfowl Area; Youth Waterfowl Day Jan. 25, Hunt Drawing Deadline Dec. 6; Charleston Civil War Fort Protected By Heritage Trust; Pump-back Turbine Testing Completed At Lake Russell; Myrtle Beach Wildlife Show Recognized Throughout Southeast.

December 96: Wearing, Not Stowing PFDs Can Save a Boater's Life; Pond Shrimp Produced Successfully With Environmentally Friendly Techniques; DNR Seeks Information On Eagle Shot At Lake Hartwell; Shakespeare And Silstar Are Honored For Rod and Reel Loaner Program; Lake Murray Waters On The Rise, Signaling End of Hydrilla Treatment; Aiken Youth Wins Again In Wildlife Food Plot Contest; Beaufort County Program to Evaluate Red Drum Stocking; Authorities Post \$5,000 Reward In Hartwell Eagle Shooting; Christmas Bird Counts To Be Held All Over S.C.; Archeologist Says Protect State's Cultural Sites Or Lose Them; Endangered Plant and Animal Species Protected by DNR Land Acquisitions; Fire in the Woodlands Can Help Wildlife and People; DNR Wildlife Biologists Studying Birds of Prey; Marine Advisory Committee To Discuss Shrimp Trawling; Give Your Holiday Tree Life After Christmas; Tenth Annual Quail Management Seminars Scheduled for March.

January 97: Developments Recognized By DNR For Protecting Natural Resources; Governor's Cup Billfishing Series Plans Six Tournaments For 1997; Productions In Shark Fishing To Protect Stocks; SCDNR Will Establish New Public Shellfish Grounds; DNR Updating Records For Disability Licenses; Illegal Hunting Sweep By DNR Nets 36 Defendants; Wildlife Restoration Program Celebrates 60 Years of Success, Hypothermia Deaths Can Be Prevented; Duke Power and DNR Sign Long-term Agreement on Keowee-Toxaway Fisheries; Deadline for Junior Duck Stamp Contest Approaches; Aquatic Plant Management Plan Available for Public Review, Camp Wildwood Is A Learning and Growing Experience; Boaters Warned To Use Caution In Low Water; Natural Resources Director Announces Retirement Plans; DNR Initiates Lake Murray shoreline habitat project; Shrimp Baiting Harvest Is Lowest Since Hugo in 1989; Champion Hosts Second Mobility Impaired Deer Hunt; Bowater Youth Deer Hunt Introduces Hunting Heritage. Nine special releases were issued on Land Resources awards made during last month's Conservation Conference in Charleston.

February 97: Darlington County Donations Create Heritage Preserve, Gov Beasley Declares Feb. 2-8 Backyard Habitat Week, State's Only Fish Lift Offers Underwater View, State Geological Survey Mapping Growth Corridors, Junior Duck Stamp Winner On Display In Charleston, Rewrite of Marine Laws Proposed By DNR, Myrtle Beach Business Fined for Black Bear Jewelry, License Benefits Expanded For Disabled Hunters/Fishermen, Youth Workshop Offers Outdoor Challenge, Materials Added To Artificial Reefs

March 97 Ten Public Forums Scheduled To Present Marine Fisheries Laws Rewrite; Boating Safety Act Places Limits On Use Of Personal Watercraft; Boater Education Classes Are Scheduled Statewide; SCMAPS Teleconference Scheduled for March 25; New Conservation Reserve Program Is Wildlife-Friendly; Wildlife Food Plot Contest Accepting Entries for 1997; Camp Wildwood Is a Learning and Growing Experience; Edisto Task Force Named 1996 Winner; Public Meetings Set On Proposed Game Zone Changes; Spring Turkey Season Has Record Potential; S.C. Duck Stamp Contest Won By Greer Artist; Special Deer Hunts Enjoyed By Youth and Mobility Impaired; Lynches River Festival Celebrates Nature and Community; Wearing, Not Stowing PFD's Can Save a Boater's Life; Wetlands Program Receives Accolades; Lake Moultrie Boat Landing (Hatchery) Closed for Final Renovations; Enrollment For Gator Season Runs April 1 Through May 1; DNR Board Endorses Moratorium On Commercial Shrimping Licenses.

April 97: . State Shellcracker Record Just Misses World Record; Boater Education Effort Directed Toward Youths; Natural Resource Director Receives Chuck Yeager Award; Economic Survey of Saltwater Fishing Tournaments Planned; Columbia Angler Breaks White Bass Record; Carp Bowfishing Record Set Again At Lake Murray; Local Students Are Winners In Wildlife Writing Competition; State Comments Are Critical Of Lake Russell Pumpback Turbine; Shrimp Growers Allowed To Import Exotic Shrimp Seed Stock; Star Fort Pond Opens For Fishing On May 3; International Migratory Bird Day Scheduled for May 10; Former Fisheries Chief (Joe Logan) Receives Fishery Conservation Award State Chapter of American Fisheries Society.

May 97: Boating Safety "Heads Up" Issued for Memorial Day, Oyster and Clam seasons To Close May 14, May 31; Women's Shooting Event Raises Funds for Outdoor Woman Program; Shark Catches Reduced in State and Federal Waters; Wildlife Conservation Workshop Scheduled for July 20-25; Begin Dove Field Preparation Now for Fall Hunting Seasons; DNR Supplies Fish to North Carolina to Replace Hurricane Fran Losses; Diamond II Takes Lead in Billfishing Series; Natural Resources Board To Discuss Sale of Venison; Schools Are Ready for May 17 ENVIROTHON Challenge; New DNR Horse Patrols May Soon Cover State; Commercial Shrimping Season Opens May 14; New Digital Map Data on DNR Home Page; Begin Making Plans Now for More Farm Wildlife; Don't "Adopt" A Fawn Found Alone In Woods; ENVIROTHON Winners Bring Trophies Home; Survey of Saltwater Anglers to Document Economic Impact; Forecasters Predict Active Hurricane Season; State Anticipates Final Report From Corps on Lake Russell Pump Turbines.

June 97: Free Fishing Days Set For June 7-8; Duke Power Helps Build Bridges for June 7, DNR Youth Fishing Rodeo; Teachers Reminded of June 10 Deadline for Environmental Training Workshops, Wildlife Field Day June 21 at Draper Wildlife Area; Hat Trick Takes Lead in Billfishing Series; Outdoors-Woman Program Set for Sept. 12-14 In Clemson; Nuisance Wildlife Control Operators Sought by DNR; June is Rivers Month In South Carolina; Berkeley County Boat Landing Has Improvements In Future; Aut-Top-Sea Gains Lead in Governor's Cup with Tagged Billfish;; Cast Netting of Overwintering White Shrimp Severely Restricted by New Law; Coordinators Are Needed for Beach Sweep - River Sweep; New Crabbing Legislation Assists South Carolina Crabbers; Boodaddy Wins Third Tourney in Governor's Billfishing Series; Walhalla State Fish Hatchery To be Dedicated June 27; S.C. Hunting and Fishing Licenses Expire June 30; State DNR Officers Concerned about Boating Under Influence; Citizen's Violation Reporting Card Will Aid Coastal Law Enforcement; Civil War Fort Ceremony Marks 1862 Battle of Secessionville.

GRAPHICS AND DUPLICATING SECTION

The Graphics and Duplicating Section include the Graphic Design unit, the Duplicating Center and Mail Room, and acts as the agency's coordinator for all publications. All mail, in-house duplicating, graphic design and outside printing is coordinated through this section on a large variety of assignments that include all publications for the department except South Carolina Wildlife magazine and certain special projects or technical reports that are assigned to other sections. This section processes work through requests from each division and is coordinated through the Awareness Committee. Once a project is approved, work is completed by direct interaction with the requestor, or writer, of the project.

The overall supervision of the section is the responsibility of the Project Administrator. In the Graphics Design unit, the Publications Coordinator provides day-to-day supervision of all art work and printed documents as well as defines job specifications for procurement. The Assistant Publications Coordinator is responsible for editing, proofing, verifying and coordinating internal work flow. In addition to these positions, this unit includes three graphic artists all of whom design, layout and assist in the production of agency publications and special projects. Two hundred sixty-nine jobs were produced by this unit, supporting the Administrative Division with 78 jobs, Wildlife & Freshwater Fisheries with 64 jobs, CEC with 37 jobs, Land Division with 30 jobs, Law Enforcement with 30 jobs, Marine Division with 22 jobs, Water with 5 jobs and Geology with 3 jobs. A second place award was received from the Association for Conservation Information for the 1997 Palmetto Portraits calendar. Additionally, the Palmetto Portraits calendar received a PICA "Award of Excellence". The Duplicating Center and Mail Room is staffed by three full time employees and one hourly employee. Duties include all in-house duplicating, mail processing/distribution, and courier services. Staff processed approximately \$193,300 in postage and ran over 2.5 million impressions on its AB Dick presses.

The objective of the section is to produce and distribute all necessary publications to the agency for: 1) Management, research and law enforcement goals, 2) Protecting and enhancing resources and habitat, and 3) Providing wildlife and fishing and general natural resources enjoyment. Since the Department is required to produce and distribute information regarding hunting and fishing Rules and Regulations and the use of Wildlife Management Areas, this section prepares and updates any publications affecting those activities in the state. Typical of such publications are the annual combined Hunting and Fishing Rules and Regulations, Turkey Hunting Regulations, the Migratory Bird Regulations and the Wildlife Management Area maps that require updating each year. The section also produces a wide variety of general information on individual wildlife species, management and research facilities, game management techniques, conservation, education, fishing, boating, and recreational outdoor sporting activities.

MAGAZINE SECTION

Magazine section's primary function is promotion and publication of *South Carolina Wildlife*, the agency's nationally recognized bimonthly conservation magazine, the flagship educational and public relations tool of the Conservation Education and Communications Division. *South Carolina Wildlife* informs the public of the value of the state's natural resources while acquainting them with the agency's programs to protect and manage these resources that affect our quality of life. The magazine, through its program and products, is a vital component in accomplishing the goals that makeup CE&C's objective within the Department of Natural Resources' strategic plan, *Resource 2000*.

Featuring articles on outdoor activities, natural and scenic areas, character profiles, conservation issues, wildlife-watching, outdoor humor, and news, *South Carolina Wildlife* also extolls the natural resources of our state and promotes its historical and cultural values, encouraging tourism and visitation through such articles as "Handmade In South Carolina" (unique crafts made from raw materials by South Carolina artists and sold at the S.C. Artisan Center in Walterboro), "A Treasured Place" (the town of Rockville and its rich family history and tradition), "Carolina Lights" (lighthouses in South Carolina), and "Creating A Backyard Habitat" (urging both visitors and residents to create a unique natural world in their own back yard). Focusing on different programs within DNR, other articles included "Come One, Come All" (Becoming An Outdoors-Woman Program for female outdoor enthusiasts), "Looks Can Be Deceiving," "Hatching A Fishery" (the newly acquired state Walhalla Fish Hatchery), and "Floral Treasures" (Wildlife Diversity Section's computer program of identifying and protecting rare and threatened plants and their habitats). Other more traditional hunting and fishing articles featured included "In The Company Of Hounds," (the rich tradition and special connection between hunting dogs and their handlers), "Toons" (what to look for in buying a pontoon boat), "Jocassee's Trophy Trout" (fishing for state-record fish in Lake Jocassee), "Waterfowling The Old Way" (paddling and the waterfowling hunting tradition), and "Dusting For Prints" (identifying animal tracks) and "Woodsmanship: The Forgotten Element of Turkey Hunting."

SCW increased its efforts to support the program known as SC MAPS, an imaginative approach to teaching about South Carolina's natural resources and their shaping of the state's history. SCW provided to teachers nearly 600 packets of mini-magazines that supplemented their classroom use of SC MAPS manuals, large, laminated high-altitude and satellite infrared lithographs, and topographic and special-purpose maps. Reaching over 17,000 students through the year, this popular cross-curricular program uses a hands-on approach to teaching students the unique nature of South Carolina's natural resources and encourages their awareness of the need to conserve and protect these resources.

In addition to this inter-agency cooperative effort, SCW also continues to work with S.C. Parks, Recreation and Tourism and other state and local agencies to seek mutually supportive methods of promoting public awareness of the state's diverse features and outdoor recreation opportunities. Articles such as "Holidays In The Parks" (holiday activities in the parks) and "Palmetto Pathway" (the palmetto trails connecting hikers with outdoor attractions) help acquaint readers with opportunities in the state parks.

Because of cooperation between the DNR and other agencies, organizations and individuals, significant areas in South Carolina have been preserved for generations to come. These efforts were showcased through magazine articles, including "A World Apart" (Sandy Island) and "Jocassee Gorges" (the Horsepasture area in the Upstate).

South Carolina Wildlife each year brings recognition to the agency and the Palmetto State for excellence in photography, writing and design through its participation in national competitions. The publication received awards from the Association for Conservation Information, Inc. (ACI), which brings together journalists and educators from state and federal wildlife agencies

nationwide, for magazine, calendars, and article. In ACI competition, the magazine placed third in overall magazine design, second in general interest article, second with the scenic "Palmetto Portraits" calendar, third with the poster, second and third in color photography and first in black and white photography. The International Regional Magazine Publishers Association (IRMA) also presented an Award of Merit to SCW for overall design.

Editorial and marketing/promotions planning moved forward, with staff continuing a 12- to 15-month advance schedule. Circulation of *South Carolina Wildlife* continued to average approximately 60,000 subscribers, reaching almost 15 percent of South Carolina households. The magazine is provided free to all South Carolina libraries and schools. New marketing efforts again centered on a cash acknowledgment renewal program to help improve renewal response.

SCW product marketing efforts were greatly increased when staff opened the South Carolina WILDLife Shop, created and mailed out product catalogs, and hired a new administrative specialist. Introduction of more new products and aggressive marketing brought increased revenues to supplement the magazine's educational efforts some 36 percent overall during the fiscal year. The best-selling "Sportsman's Calendar and Almanac" almost sold out again. New magazine byproducts included sporting series and nature series T-shirts for kids and adults, Tides and Times, flash guides and identification posters for freshwater/saltwater fish and seashells and the new medallion "Carolina Bays" and "Rainbow Falls" scenic posters, and waterproof lake maps. Combination sets of products and gift items were test-marketed and proved successful. More new book titles, including children's books, fulfilled through Sandlapper Press, were introduced. New-product development for 1996-97 continued with test sales of products during the holiday season.

The agreement continued with S.C. Parks, Recreation and Tourism whereby SCW products were sold through PRT's park stores and gift shops. Wholesale marketing to retail locations was continued, with ten stores again carrying SCW merchandise.

A magazine business plan, prepared by John Davis, Editor-in-Chief of the magazine, was begun. This plan examines program costs and profitability and existing and potential sources of revenue generation needed to make the program operations financially self-sufficient. It will serve as an outline for the next five years of operation for the magazine's program.

Magazine section photography staff, whose primary responsibility is to fulfill assignments for publication in the magazine and its catalogs and products, are also responsible for all still photography used by the agency. Photographers from the section regularly provide photo support and expertise to other divisions and agencies, including handling ID photos of DNR personnel. Section staff coordinate and judge the SCW's *Photography Print Exhibition* for the Palmetto Sportsmen's Classic.

Magazine design and layout techniques were refined, using computer technology. Editorial and graphics staff continued advising, proofing and consulting on various special publication projects. Staff also assisted with other special responsibilities, such as the agency's RESPECT (outdoor ethics) program, the Governor's Cup Billfishing Tournament Series, the Palmetto Sportsmen's Classic, the Myrtle Beach Wildlife Exposition, and the department exhibit. Staff also participated in numerous DNR Strategic Planning sessions.

With the ongoing support and counsel of the DNR Board and the CEC Advisory Committee, *South Carolina Wildlife* magazine continues its tradition as South Carolina's magazine, one that represents the best interests of the natural Palmetto State to a diverse audience of both in-state and out-of-state readers.

GEOLOGICAL SURVEY

During FY 1996-97, the Geological Survey worked to define, develop, and expand its program areas under a new service-oriented mission direction. Many of the projects planned under those program areas required Geological Survey core capabilities, e.g., geologic mapping, as well as the development of new skills and technology. The selection and prioritization of projects were based on 1) the identification of the level of hazard or environmental concern posed by a particular problem, and 2) the socio-economic impact of the problem. Projects were assigned to either Hazard Analysis, Land Use-Environmental, Mineral Resources, or Education programs. Regardless of program area, the Geological Survey continued to impartially collect, study, interpret, and report geologic information affecting the daily lives of the state's citizens.

- **Land Use-Environmental Program**
- **Hazard Analysis**
- **Mineral Resources Program**
- **Education Program**

Land Use-Environmental Program

Program priorities in all areas were also based on the availability of additional funding, giving the STATEMAP component of the National Cooperative Geologic Mapping Program (Public Law 105-36) a high priority under the Land Use-Environmental Program. The Geological Survey received \$116,000.00 from the 1996 STATEMAP program to conduct new geologic mapping along the I-85 growth corridor in Greenville and Spartanburg counties and in the upper Lake Marion area. Along the I-85 growth corridor, six 7.5-minute quadrangles, i.e. for Paris Mountain, Pelham, Inman, Valley Falls, Riedville, or Wellford, were mapped and placed on Open File. The Simpsonville 7.5-minute quadrangle was also completed with Geological Survey funds. In the Lake Marion area, the St. Paul, Pinewood, Lone Star, and Fort Mott 7.5-minute quadrangles were mapped and placed on Open File. This work required the use of 119 auger holes, five borehole cores, and a number of hand auger holes.

To compliment the STATEMAP work, the Geological Survey assisted geology graduate students at Eastern Carolina University and the University of South Carolina in developing EDMAP proposals under the National Cooperative Geologic Mapping Program. These students conducted mapping along the I-85 growth corridor in either the Pelzer or Gaffney 7.5-minute quadrangles. Both maps were placed on Open File.

At the required 1997 STATEMAP Advisory Committee meeting in March, it was suggested that the Geological Survey begin placing more emphasis on the state's coastal geology. The unit worked cooperatively with the Florida Geological Survey on a project on Otter Island in the ACE Basin. Two regional SET (Sedimentary Erosion Table) stations were built and ground level change data will be compiled in a regional U.S. Geological Survey data base. Additional work was thought necessary in the ACE Basin and the unit began to acquire equipment to conduct ground level change studies along the coast in cooperation with the Marine Resources Division. Part of the initial phase of the Coastal Change project (now Coastal Change program) was also to introduce coastal planners to information on the region's geology. Work continues on all phases.

In another Land Use-Environmental project area, the map, report, and logs of the Girard NE 7.5-minute quadrangle of the Savannah River Site (SRS) were completed. The completion of this map represented the end of one phase of geologic study of the SRS which had lasted six years. Work continued on another major phase of the SRS mapping project. As part of this mapping, 121 auger holes were drilled and cuttings logged on the SRS site, as well as rough logging of 10 core holes and examination of field exposures. Compilation of maps, logs, and reports of five different SRS quadrangles was begun after this field work was completed.

Hazard Analysis

The *Earthquake Hazard Map of the South Carolina Coastal Plain* was published and presented to emergency managers at a meeting held at Charleston Southern University. The map was well received and a large number have been distributed to other State and local agencies.

A multi-year hazard project involving the mapping of the shoreline of Lake Murray was begun. Over 200 miles of shoreline were mapped under this initial phase of a continuing project. This work complimented mapping of urban areas on the Irmo, S.C., 7.5-minute quadrangle sheet. Faults showing movement of the dirt-rock interface were identified in the mapping of new road exposures on State Highway 60 at the 102 exit of I-26 in Irmo; mapping of Lake Murray exposures was intended to identify the structural style of faulting in the immediate vicinity of the Lake Murray dam.

The 1997-1998 STATEMAP proposal was expanded to cover three project areas instead of two and the Geological Survey was awarded \$110,000.00 to conduct STATEMAP 7.5-minute quadrangle mapping. With this award, mapping in 1997-1998 will expand into the Pageland area to understand fault reactivation. Mapping along the I-85 growth corridor and Lake Marion will continue, and this work is for both land use and hazard analysis purposes.

Mineral Resources Program

The 1:500,000 scale Mineral Resources Map was compiled and digitized. The digital file was distributed to a number of users, but hard copy publication was placed in stasis until funds become available. After the Mineral Resources Map is published, the Mineral Resources Program will be phased into the Land Use-Environmental Program where the conservation of non-renewable resources can be emphasized. Specific mineral resource information will continue to be available to the public and industry upon request.

Education Program

In addition to mapping, the Geological Survey conducted numerous classroom and teacher-workshop presentations. A pilot project was begun to address aspects of eco-tourism of Paris Mountain State Park from a geology perspective. The State Geological Map and the State Mineral Resource map were also combined into a single 1:1,000,000 scale map for the SCMAPS program. Staff edited and published Volume 39 of *South Carolina Geology*. This volume included a peer reviewed paper by staff titled, *Geology of the Lake Murray area — A progress report focused on mapped observations of the south shore*.

LAND RESOURCES AND CONSERVATION DISTRICTS

LAND RESOURCES AND CONSERVATION DISTRICTS ADVISORY COMMITTEE

William S. Simpson III	James Island
Thomas E. Garrison III	Pendleton
Roger Leaks, Jr.	Columbia
Glenn C. Alexander	Van Wyck
Patricia C. Edmonds	Greenwood
Larry E. Nates	Gaston
Charles R. Snow	Chaplin
J. Chalmers Dial	Moncks Corner
Webb M. Smathers, Jr., Ph. D.	Clemson

ASSISTANCE TO LANDOWNERS AND USERS - During FY 1996-97, 978 staff days of technical assistance were provided through conservation districts. Technical duties include assisting conservation districts with planning and installation of soil and water conservation practices (including land treatment watershed projects and implementation of the Clean Water Act); monitoring erosion, sediment, and storm water problems; and demonstration of conservation tillage and drip irrigation. Through conservation programs in the districts more than \$6.9 million in federal cost share assistance has been provided. In addition to cost share dollars, annual rental payments to landowners enrolled in the Conservation Reserve Program will total an estimated \$11.1 million for the 269,531 acres placed in the program. 69.3% of the total acres of cropland and pasture in the state has adequate soil and water conservation management. There are 35,973 conservation district cooperators and over 7.1 million acres in South Carolina are placed under conservation plans through conservation districts.

CONSERVATION TILLAGE DEMONSTRATION PROGRAM - The Conservation Tillage program demonstrates an innovative approach to promote the adoption of emerging conservation tillage technology to conserve energy, save time and money, reduce soil erosion, and improve water quality. Conservation tillage equipment (no-till drills, planters, and drip irrigation machines) is made available to the general public through the conservation districts, allowing land users to test for themselves this proven conservation technology before investing in the equipment. In 1997, the total acres using conservation tillage in South Carolina exceeded 360,208 acres, an increase of over 41,000 from the previous year. The equipment provided through conservation districts contributed to this increased acreage. The Division sponsored field days and demonstrations jointly with conservation districts and with assistance from other federal, state, and private agencies.

CONSERVATION DISTRICT COMMISSIONER AND WATERSHED DIRECTOR ASSISTANCE - The Division provides administrative and technical assistance in the implementation of the Soil and Water Conservation Districts Law and the Watershed Conservation Districts Law. Division staff attended over 700 conservation district board meetings, watershed district meetings and training sessions providing direct assistance to the district commissioners, watershed directors, district employees and other citizens. South Carolina has 37 Watershed Conservation Districts with a combined total of 1,232,654 acres. Division staff provided direct assistance such as training watershed directors and providing administrative assistance.

ENVIRONMENTAL EDUCATION INSTITUTES FOR TEACHERS - The Division, in cooperation with conservation districts, co-sponsored 13 Environmental Education Institutes for Teachers. The Institutes were held in cooperation with local school districts and covered many topics related to environmental education. These Institutes offered teachers an excellent

opportunity to learn about the environment and conservation education services available to the community. Over 250 teachers participated in the environmental institutes and earned re-certification or graduate credit. SCMAPS was conducted as a part of many of the Institutes and as a stand alone program through the conservation districts.

CONSERVATION WORKSHOP FOR YOUTH - Staff conducted the annual conservation workshop which is held on the Clemson University campus. Sponsored by their local conservation district, 100 high school students from across the state attended the week-long activity. During the workshop, the youth were informed of the importance of land and related natural resource conservation and were prepared to serve as youth commissioners in their local districts. Six scholarships were awarded to participants who excelled in workshop activities.

BARRIER ISLAND COASTAL ENVIRONMENTAL WORKSHOP - The Barrier Island Coastal Workshop, held at Camp St. Christopher south of Charleston, is a weekend workshop for high school students to study the coastal environment. Sessions on ocean life, beach formation, marsh and wetland ecology are presented. Participating students are sponsored by their local conservation district. The workshop is coordinated by Division staff.

ESSAY CONTEST - This annual statewide contest is sponsored by the Department through the 46 conservation districts for grades 5-9. This year's theme was "Tree-mendous Treasures." Staff obtained the services of the SC State Library to prepare a bibliography of forest conservation reference publications and provided the bibliography to conservation districts for use with schools. Participating students write approximately 35,000 essays each year in the conservation essay contest.

POSTER CONTEST - This annual statewide contest is sponsored by DNR through the conservation districts and school districts for grades K-5 each spring. The 96-97 theme was "Forest Communitrees." The creation of the poster is a class project designed to promote the benefits of group effort and participation. Conducted in cooperation with the South Carolina Wildlife Federation, the competition's winning posters are placed on exhibit at the SC State Museum in Columbia.

ENVIROTHON - This was the first year South Carolina participated in "Envirothon" which is a national program involving a competition by high school teams in natural resource science. 41 teams competed in April for the privilege of representing South Carolina in national competition held in August. Staff coordinated this annual event, providing training and educational materials to teachers and participants. The Envirothon teams are sponsored by their local soil and water conservation district.

ASSISTING OTHER CONSERVATION PROGRAMS - Division staff are involved in various conservation programs through their assistance to conservation districts. These include: Earth Day, Farm-City Week, Beach Sweep/River Sweep, regional and state science fairs, FFA Land Treatment, Arbor Day, Adopt a Landing, etc.

EDUCATION AND PUBLIC INFORMATION PROGRAMS - Division staff and conservation districts conduct an extensive education and public information program on natural resource conservation. With a network of 46 offices, one in each county, the conservation districts make available timely and important information to the public. During FY 1996-97, the Division and conservation districts reached over 400,000 citizens through methods such as news releases, workshops, exhibits, classroom presentations, and demonstrations. Awards - The Agency recognized the achievements of individuals and businesses that have been good stewards of our natural resources through awards and recognition programs such as the **Clean Water Farmer Award, Land Development Stewardship Award, Outstanding Conservation Teacher Awards, and the Outstanding Conservation District Commissioner Award.**

CONSERVATION PARTNERSHIP CONFERENCE - The 1997 Joint Conference of the SC Association of Conservation Districts, USDA-Natural Resources Conservation Service and Land

Resources and Conservation Districts Division of SCDNR was held January 2-4 at the Charleston Place Hotel. Over 400 conservation leaders from across the state attended. The conference theme, "Leadership for the Future," focused on providing leadership in all areas of natural resource conservation.

The **PLANNING AND POLICY SECTION** provides a wide variety of land resource information and conservation planning assistance. Staff collect, analyze, and apply information on the existence and use of the state's land-based natural resources, and disseminate this information in the form of resource studies, inventories, maps, and direct public assistance. Staff work with the general public, government agencies, private companies, conservation organizations, and other land users to promote wise land management decisions, sustainable development, and effective resource planning efforts in the state.

LAND RESOURCES INFORMATION CENTER (LRIC) - The LRIC, established in 1977, is the state affiliate of the U.S. Geological Survey's (USGS) Earth Science Information Center (ESIC). This Center is a public outlet for resource information and a vital source of data for planners, resource managers and the general public. The resources of the Center are utilized to promote land conservation and inform the public on available map and photo products and their applications. The Center provides products such as topographic maps, nautical charts, aerial photographs, digital data, National Wetlands Inventory (NWI) maps, lake and special purpose maps, and other information. In addition, professional staff provide expertise and guidance to individuals in project planning and referrals for other related information. The scope of services and products available through the Center during FY 1996-97 included: Approximately 6,000 individuals were directly assisted through the LRIC as walk-ins or letter/fax and phone call customers. The majority of these individuals had multiple requests for various cartographic and resource planning products and technical assistance. A total of 17,429 cartographic products were sold and thousands of additional products were provided at no charge to the public. It is estimated that 5,000 to 8,000 additional individuals were also reached through various presentations, exhibits, and meetings concerning the services of the LRIC.

Exhibits, presentations, newspaper, and magazine articles were utilized during the year to increase awareness of the services of the LRIC and the application of available information for wise land management and resource planning decisions. With the help of other DNR programs, the Center was able to increase its visibility through special radio announcements throughout the state. Exhibits were placed at a number of events, including the Myrtle Beach Wildlife Exposition, the Southeastern Wildlife Exposition, the Palmetto Sportsmen's Classic, NAPP '99 Planning Conference, The Partnership for Land Protection Conference, and various National Flood Insurance Program (NFIP) conferences and meetings.

Two editions of the Land Resources Information Center Bulletin were distributed to more than 700 subscribers and also provided to the public through the LRIC and other DNR programs. This bulletin describes current products and services related to cartographic, earth science, and land resources information.

The color laser copier and small scale lamination machine obtained last year enabled educators, small businesses, governmental agencies, and the general public to obtain on-site high quality inexpensive copies of color infrared NAPP aerial photography.

NAPP PROGRAM - The Division coordinates the National Aerial Photography Program (NAPP) for the State. This federal-state, USGS sponsored cost-share program, offered every five years, is a cooperative public and private sector effort to acquire a statewide set of high altitude color infrared aerial photography and to offer a wide range of photographic products to the public through the LRIC. This program involves the financial cooperation of 27 public and private organizations. There is a total of 4,700 nine-inch square film images with each separate exposure capturing 32 square miles of terrain. The rigid specifications of this aerial photography program

make it one of the best in the nation, producing high resolution, high quality, color infrared film for a wide variety of uses. Program highlights include:

During FY 1996-97, 6,185 NAPP products were provided to the public through the LRIC. The Center provided assistance in image interpretation, project development, and obtaining NAPP products through in-house reproductive capabilities or ordering custom products from a private sector partner.

The Section coordinated the NAPP '99 Planning Conference to solicit input and support for the next statewide flight under the National Aerial Photography Program scheduled for 1999. Nearly 60 representatives of public and private organizations heard speakers from the U.S. Geological Survey and Federal NAPP Steering Committee, involved private sector representatives, and SCDNR. A state NAPP Steering Committee was formed to provide direction and pursue funding sources for this program.

SCMAPS PROGRAM - SCMAPS is a three-way venture designed and implemented by the S.C. Department of Education, SCDNR, and Clemson University. The Program is designed around map products with curriculum activities developed for Ecology, Earth Science, Social Studies, History, Math, and Literature. Section staff assist in the coordination and teaching of SCMAPS workshops, serve on the Advisory Board, and coordinate the compilation and distribution of maps and photography products that make up the SCMAPS teaching packages.

Section staff coordinated the design, procurement and printing of the Savannah River Site and Lake Jocassee SCMAP products. Staff also made major contributions in the lesson plans and exercises for these two new SCMAP sites.

The Section's Soil Scientist developed a new statewide general soil map with accompanying lesson plans for the SCMAPS program. The Section also coordinated the printing of the State Geology Map and an Economic Minerals Map on the reverse side of the soils map.

The third edition of the SCMAPS teacher's guide was developed and printed with the help of section staff. This included the creation of new natural resource related background materials and exercises and also an index of all natural resource related material throughout the book.

Staff assisted in developing a comprehensive strategy for implementing the SCMAPS Program. This plan calls for enhanced teacher workshop opportunities through the state's 13 Science and Math HUBS and Soil and Water Conservation District's 13 Environmental Teacher Institutes.

Staff worked with representatives from eight southeastern states involved in the expansion of SCMAPS to the Southeastern region. This effort is being called the Southeastern Maps and Aerial Photography System (SEMAPS) and is funded through a National Science Foundation Grant to Clemson University.

Staff assisted with various other educational efforts during the year including the Teaching KATE Program, Envirothon Program, Soil and Water Conservation District's Environmental Teacher Institutes, participation in the Coalition for Natural Resource Education (NRE), Clemson Youth Workshop, and providing instructional training for various teacher and student sessions.

PLANNING OUTREACH PROGRAM - During FY 1996-97, the Division continued to effect planning outreach through a multi-disciplinary team of natural resources professionals who provided information tools and services to support conservation planning by regional councils of governments, local governments, and private enterprises.

The Section developed and distributed a resource information packet for planners. This packet contains information from the DNR on major natural resource issues, professional contacts within the DNR and other agencies, and various sources of resource information helpful to planners in the development of the natural resources element of local government comprehensive plans.

The Planning and Policy Section hosted or attended natural resources planning support meetings for Greenville County, Spartanburg County, Beaufort County, and Central Midlands Regional Planning Council staff to assist them in the preparation the natural resources element of

local comprehensive plans. The Section coordinated technical staff from various divisions of DNR and other state and federal agencies to participate in these sessions and provided various information, data and other input useful to these comprehensive planning efforts.

The Section produced a conference on Partnerships for Land Protection: Options for Protecting South Carolina Lands which attracted about 175 registrants from land trusts, conservation districts, environmental groups, federal, state, regional, and local governments, businesses, and academic institutions. The agenda included SCDNR programs for Heritage Trust, Wildlife Management Areas, and Scenic Rivers, as well as a special presentation by Dr. Timmerman of the Jocassee Gorges video. One of the conference handouts was a new brochure prepared by staff about the various land trust organizations in South Carolina.

Staff participated as conference hosts, planners, speakers, or exhibitors in a variety of other planning-related meetings, such as the State Mapping Advisory Committee's fall conference, the South Carolina Chapter of the American Planning Association's quarterly conferences, the Beaufort Greenways Forum of the Palmetto Greenways Initiative, the Lovable Communities Conference, the NAPP '99 Planning Conference, the Carolina's Land Conservation Network, the SC Department of Transportation's Transportation Enhancement Judging, the Greenways and Long - Distance Trails workshop, and various meetings of the SC Aquatic Plant Management Council, and the Clemson University Geological Science Advisory Committee.

STEWARDSHIP DEVELOPMENT PROGRAM - The Stewardship Development Program recognizes annually those development projects in South Carolina which have done an outstanding job of blending natural resources protection and enhancement into their project design and management. A stewardship development sign and logo may be used by those projects chosen for this recognition to advertise their achievements. A Stewardship Development Advisory Board composed of 17 co-sponsoring representatives of public and private organizations provides overall direction to this program and serves as a judging committee for project selections. The Stewardship Development Program provides opportunities for developers to receive SCDNR suggestions and guidance for the incorporation of natural resource protection within their development planning and management goals.

Twelve projects were submitted for the 1996 Stewardship Development Program. Three of these projects were selected for Stewardship Development Projects: Chau-Ram County Park, a 70-acre park in Oconee County; Fort Jackson, a 52,000 acre military facility in Richland County; and Newport, a 53-acre residential community in Beaufort County.

The Stewardship Development Program also cited five other projects for outstanding achievements in land stewardship for specific efforts within a project. These include: Bailey Island Club, a 694-acre residential community in Charleston County; Chestnut Hill Plantation, a 400-acre residential community in Richland County; DeBordieu Colony, a 2,616-acre residential community in Georgetown County; Haig Point, a 1000-acre residential community in Beaufort County; and Laurel Lake, an 80-acre residential community in Greenville County.

Staff began preparation of a guide of stewardship development concepts and practices. It will be a source book of voluntary stewardship concepts for planners, developers, and the general public. The guide will also help define a good stewardship development by providing examples. The source book will be compiled from a review of literature in the area of environmental planning, site design, and best management practices.

LAND RESOURCES INFORMATION - The section continued the collection, analysis, and distribution of cartographic, earth science, and natural resource information to support Division goals and meet requests from the public. Activities included:

Continued to update the inventory of SCDNR owned lands in the state as new records were provided by the SCDNR's Administration Division and the Heritage Trust Program. Staff reviewed SCDNR deeds, plats, maps, and visited county courthouses to obtain records for this inventory.

An Arc/Info GIS with general property boundaries on a 1:100,000 scale base map was created.

Updated computer resource databases to meet program and public requests. Databases included: Topographic mapping status, Geographic names, Aerial photography inventory, Environmental contacts directory, and Resource managers and planners mailing lists.

Under a grant from the U.S. Geological Survey, the SCDNR is conducting a GAP Analysis Project for South Carolina that will ultimately be used to measure the "gap" between protected lands in the state and those needing protection in order to conserve natural biodiversity. As a part of this effort, the section has begun an inventory of state and federal land in the state to determine the public lands and their level of management. Staff contacted approximately 85 state and federal agencies and are working with them to determine if they own or manage any land, and, if so, to obtain information on the acreage, use of the property, general location, and boundaries of the larger tracts. These data will be used to create a managed land data layer which will be an essential component in the GAP Analysis of South Carolina.

SOIL SURVEY PROGRAM - The Division is a cooperator with the USDA-Natural Resources Conservation Service (NRCS) and the S. C. Agricultural Experiment Station in the National Cooperative Soil Survey Program. Soil surveys provide valuable information on the state's soil resources, which is essential for land use planning, economic development, wetlands identification, soil and water conservation, agricultural operations, and a variety of other uses. FY 1996-1997 accomplishments included:

Numerous requests for specific soils and land use information by phone, walk-ins, and site visits were answered by the State Soil Scientist. These inquiries came from local governments, federal and state agencies, utility companies, environmental consultants, private citizens, school children, and teachers.

In a continuing effort to build public awareness as to the value and use of available soils information, educational programs for both adults and youths were developed and implemented. Educational efforts included writing background information and exercises for the soils portion of the SCMAPS program, coordinating a soils component of the Envirothon, Teaching KATE, Conservation Youth Workshops, and Environmental Teacher Institute Programs, etc.

The Section's Soil Cartographer completed work on the new Bamberg County Soil Survey, which is to be published by the USDA-Natural Resource Conservation Service.

The Section's Soil Scientist developed and printed the South Carolina General Soil Map which is being used as an educational tool through programs such as SCMAPS and others.

RESOURCE TECHNOLOGY AND DIGITAL MAPPING - This program is involved with satellite image mapping performed by the Southeastern Remote Sensing Center (SERSC) and digital land resource related geographic information systems (GIS) data uses. These functions produce various land use/cover data sets and special-purpose GIS data bases for use by resource managers, urban and regional planners, conservation organizations, and the public. Major accomplishments for FY 1996-97 include:

The SERSC disseminated land cover data to a diversity of users throughout the year. Program staff also disseminated land resources related digital data and map products to public/private sector users at nominal cost.

Staff mapped urban change from 1973 to 1995 in the metro Charleston area using 12 satellite images over 22 years together with local planner knowledge of land uses. This information can assist planners in guiding future development within this fragile coastal ecosystem.

Staff performed land cover verification field work in conjunction with the NOAA Coastal Change Analysis Program (CCAP) by checking approximately 1,500 sites in coastal South Carolina. This effort contributes to the refinement of current land cover mapping based on satellite image analysis in cooperation with the NOAA Coastal Services Center in Charleston. Staff presented results of this work at the CCAP annual meeting held at the NOAA Coastal Services Center in

Charleston, including satellite image derived land cover data, remotely mapped and field validated using global positioning systems (GPS).

Staff merged multi-spectral and panchromatic SPOT satellite imagery to produce a digital picture of the Winyah Bay Focus Area. This image was printed as a poster and distributed to stimulate awareness of the region's precious resources. This project was completed in partnership with the Winyah Bay Focus Area Task Force, the USFWS Coastal Ecosystem Program, and USEPA.

Staff assisted with an interdivisional South Carolina GAP Analysis Project (SCGAP) to produce management information to aid in the protection of the state's biodiversity. Staff continued to map the state's vegetation layer using satellite analysis and air photo interpretation and worked with North Carolina GAP analysis staff to fly aerial videography over major vegetative regions of South Carolina in late October. SCGAP meetings were hosted including multi-state meetings with representatives from South Carolina, North Carolina, Georgia, and Florida in order to share information on successful methods and techniques. Staff also began the design and development of a protected land layer for this project.

Staff worked on the development of a land management GIS for the Yawkey Wildlife Center. This special service GIS will consist of 13 layers of information and will serve as a prototype for other wildlife management areas and their managers. Layers include impounded wetlands, water control trunks, land management tracts, dirt roads, landcover, present and future practices such as controlled burning, red cockaded woodpecker colony mapping and various maintenance schedule data, etc. Field global positioning system (GPS) mapping coordinates and ground photography were scanned and entered into CD for linking to ArcView map files.

In partnership with the Palmetto Greenways Initiative in the City of Beaufort Greenways Project, staff produced a Beaufort Greenways GIS which included potential land for green space, drainage systems, road systems, optimal route selection for exploration of the natural and cultural resources of Beaufort, etc.

17 quad maps containing ecological community types were joined into a single mosaic of the Little Pee Dee Watershed. This image and acreage database was developed jointly with SCDNR's Heritage Trust Staff and will be utilized by the Wildlife Diversity Section for future planning purposes.

A GIS inventory of all lands owned by the SCDNR with accompanying statistical data on each of these properties was completed. This inventory will be ongoing and serve as a management tool for SCDNR resource managers.

ENVIRONMENTAL REVIEW PROGRAM - This program provides comments as part of SCDNR's inter-divisional environmental review process on state and federal environmental permits. Staff coordinated input from a multi-disciplinary team of professionals including an engineer, soil scientist, and planner. The Division received and provided comments on 276 projects during the year.

NATIONAL FLOOD INSURANCE PROGRAM - The National Flood Insurance Program (NFIP) serves as a liaison between the Federal Emergency Management Agency (FEMA) and the 193 towns and counties in the state that participate in the program. Staff work with the 223 communities identified as having areas of a special flood hazard by the Federal Emergency Management Agency. During the Federal FY1997 funding period, 10 communities were visited to evaluate community enforcement; local official workshops were held; and three newsletters were published and distributed to 700 local officials, emergency management coordinators, and chief executive officers. More than 2,646 requests for information and technical assistance were received and processed. Forty-three of the 46 conservation districts are distribution points for providing flood insurance maps to a variety of individuals, including appraisers, real estate agents, mortgage lenders, insurance agents, surveyors, engineers and local floodplain management

officials. More than 300 people attended training courses coordinated by NFIP staff on floodplain management issues. Five new communities joined the NFIP during the year. Flood policies in effect increased 10% since February 1996.

NONPOINT SOURCE PROGRAM - Nonpoint source pollution (NPS) control is primarily a land-based approach to water quality protection. NPS control involves reducing the runoff of sediment, fertilizers, pesticides and other pollutants from rural and urban areas, and preventing the runoff from reaching waterways, waterbodies, and groundwater. The Nonpoint Source Program includes education, training, demonstration of best management practices (BMPs), and technical assistance on the selection and design of BMPs. BMPs are techniques that have been determined to be the most effective and practicable methods of reducing NPS pollution to levels that meet desired water quality. BMPs are aimed largely at preventing or controlling pollutants at their origin (e.g., reducing tillage and maintaining adequate residue on cropland to reduce the runoff of soil, fertilizers and pesticides; applying fertilizers according to soil test results to avoid over-application and possible leaching or runoff of nutrients; using vegetation and mulch to reduce erosion on a construction site; or using a sediment basin on the site to collect runoff). BMPs generally have multiple benefits. For example, in addition to reducing off-site water pollution, cropland BMPs help to increase profit potential by avoiding wasteful application of nutrients and chemicals and retaining soil, fertilizers, and pesticides on the land for crop production. These kinds of benefits are strong selling points in encouraging land users to implement BMPs voluntarily.

Projects are developed and implemented in cooperation with other agencies and organizations such as conservation districts, the Natural Resources Conservation Service, Clemson University, Lake and Watershed Association of South Carolina, S. C. Sustainable Agriculture Network and land users. This cooperation increases support for the projects, maximizes the use of financial resources, and increases the effectiveness in improving water quality. The long-term goal of the Nonpoint Source Program is to institutionalize NPS pollution prevention as a permanent part of SCDNR programs and of land management by the public and private sectors in South Carolina. Projects are carried out under the umbrella of the state nonpoint source management program for South Carolina. The program is implemented pursuant to Section 319 of the federal Clean Water Act which requires each state to identify NPS problems and to implement preventive and corrective actions. SCDNR obtains competitive grants from the Clean Water Act to implement the Nonpoint Source Program.

WATERSHED PROJECTS - The state nonpoint source management program identifies water bodies and watersheds where nonpoint source pollution is a problem or there is a strong potential for pollution due to land use activities in the watershed. Projects are developed in conjunction with soil and water conservation districts to protect surface water and ground water in the watersheds.

The **Camping Creek/Bush River Agricultural Watershed Project** in Newberry County was continued for the third year to provide education, training, technical assistance, and demonstrations for farmers on the management of fertilizers, pesticides, and land application of animal wastes. Activities during the year included workshops, development of nutrient management plans, development of a computer expert system to assist farmers with the selection of pesticides for use on cropland, development of a local nutrient testing service for poultry litter used as fertilizer to assist farmers in avoiding over-fertilization, and demonstrating the proper pumping of animal waste from lagoons and irrigating it onto agricultural land for fertilizer. The project is being implemented in cooperation with Newberry Soil and Water Conservation District, Clemson University, SC Department of Agriculture, and USDA-Natural Resources Conservation Service, and SC Department of Health and Environmental Control.

The **Stevens Creek Watershed Project** in Edgefield, Greenwood, McCormick and Saluda counties was continued for the second year. The project includes education, training, technical

assistance and demonstrations on BMPs to reduce sediment and other nonpoint source pollution from agriculture, silviculture and unpaved roads. Activities during the year focused on the installation of demonstrations and the use of them to conduct education and training, use of water quality monitoring to evaluate the water quality benefits derived from using the BMPs, and development of technical guidelines for unpaved road stabilization and maintenance. The project is being implemented in conjunction with Edgefield Soil and Water Conservation District, Ninety-Six District Resource Conservation and Development Council, Inc., and SC Department of Health and Environmental Control. Other cooperators include Greenwood, McCormick and Saluda Conservation Districts; Edgefield, Greenwood, McCormick and Saluda counties; Natural Resources Conservation Service; and SC Forestry Commission.

The **Conneross Creek Watershed Project** in Oconee County was continued for the second year. The project includes education, training, technical assistance, and demonstrations on BMPs to reduce nonpoint source pollution from cropland, pastures, dead bird disposal (from poultry operations), and poultry manure management. Activities during the year focused on providing technical assistance to farmers to plan, design, and implement practices that also served as demonstrations for education and training. The project is being implemented in conjunction with Oconee Soil and Water Conservation District, Natural Resources Conservation Service, and SC Department of Health and Environmental Control.

The **Silvicultural BMP Demonstration and Education Project** in Pickens County was started to conduct education, training, and demonstrations on the use of BMPs to reduce erosion and sedimentation from timber harvesting, site preparation, and replanting in foothill and mountainous watersheds. Activities during the year focused on the installation of BMPs on a tract of timber that was being harvested; using the site for education and training for landowners, logging contractors and other timber interests; evaluating the performance of the BMPs; and monitoring water quality upstream and downstream from the site. The project is being implemented in conjunction with Pickens Soil and Water Conservation District, Natural Resources Conservation Service, SC Forestry Commission, and SC Department of Health and Environmental Control.

The **Streambank Stabilization Demonstration and Education Project** in Greenville County was started to conduct education, demonstration, and training on the use of BMPs to reduce streambank erosion caused by urban runoff, and to refine current BMP design specifications based on the performance of the BMP demonstrations. Activities during the year focused on the selection of demonstration sites for the project. The project is being implemented in conjunction with Greenville Soil and Water Conservation District, Greenville County, and SC Department of Health and Environmental Control.

AGRICULTURAL WATER QUALITY HANDBOOK - Work was completed on the development of *Farming for Clean Water in South Carolina: A Handbook of Conservation Practices*. The primary purposes of the handbook are to provide practical information to farmers to assist them with understanding, planning, and implementing whole-farm resource management plans to prevent nonpoint source pollution, and to provide a publication that can be used by agencies and organizations to communicate among themselves and assist farmers. The handbook was developed in cooperation with the Natural Resources Conservation Service. Over 200 farmers and individuals from more than 50 agencies and organizations assisted with the project by providing information, suggestions, and review and comment of material as it was written.

URBAN CONSERVATION CENTER - A cooperative project was continued with Clemson University to develop an Urban Conservation Center at the Sandhills Research and Education Center near Columbia. The purpose of the center is to provide education, demonstration, and training on urban nonpoint source pollution for the construction industry, the general public, teachers and students. Activities during the year focused on the development of educational materials for students and teachers, designing and installing BMPs, and conducting workshops.

and educational tours for teachers and students.

LAKE AND WATERSHED ASSOCIATION OF SOUTH CAROLINA - The Division worked with the Lake and Watershed Association of South Carolina (LWASC) to conduct public education on the relationships between land and water management as a component of comprehensive natural resource planning and management.

SUSTAINABLE AGRICULTURE - The Division continued an initiative on sustainable agriculture to promote agricultural practices that are environmentally sound, economically feasible, and meet food and fiber needs. The initiative incorporates sustainable agriculture into other projects and it focuses on participation with other agencies and organizations. Activities during the year included development of a draft educational brochure on sustainable agriculture and conducting a sustainable agriculture forum in March 1997 in conjunction with the S. C. Sustainable Agriculture Network.

CERTIFIED CROP ADVISERS - At the request of the American Society of Agronomy, a staff member served on the South Carolina Certified Crop Adviser (CCA) Board, and chaired the Board's Standards and Ethics Committee. This committee reviews the education, experience, and reference credentials of individuals applying to be Certified Crop Advisers in South Carolina. The SC CCA Program is part of the National CCA Program administered by the American Society of Agronomy. The CCA Program is a voluntary program under which private sector and agency individuals who advise farmers on crop production can be certified based on their competency in soil and water management, soil fertility, pest management, and crop production.

LANDSCAPE ARCHITECTS - The SCDNR is responsible for the registration of Landscape Architects under the authority of the Landscape Architects Registration Act, Chapter 40-28-10 of the SC Code of Laws of 1976, as amended, and is advised and assisted by the Landscape Architect Advisory Council. The purpose of the Act is to protect the health, safety, and welfare of the public through the registration of qualified professionals. Staff provided for annual registration renewals, investigated complaints, and assisted the Landscape Architect Advisory Council. A directory of registered landscape architects and a brochure on the program are available to assist the public in understanding the role and the qualifications of the professional landscape architect in South Carolina. Currently, 415 Landscape Architects are registered, and 65 firms hold Certificates of Authorization in South Carolina.

LANDSCAPE ARCHITECTS REGISTRATION EXAM (LARE) - The Department is a member of the national Council of Landscape Architectural Registration Boards (CLARB) and administers the national registration exam. CLARB prepares and evaluates the national registration exam for landscape architects. The entire exam is offered in each June and the performance sections are offered again in December. This national registration exam is administered by 45 states, British Columbia and Ontario. These boards regulate the profession of landscape architecture. The SCDNR proctored 16 candidates who sat for 76 individual sections during the three-day session of the June exam. During the two-day December session, 16 candidates sat for 30 individual sections of the exam.

LANDSCAPE ARCHITECT ADVISORY COUNCIL - The SCDNR appoints a five member Landscape Architect Advisory Council composed of professional landscape architects with a minimum of five years experience to assist the Department.

Steve McCalla	Columbia
Jean Rothrock	Pawley's Island
Perry Wood	Hilton Head
Lolly Tai	Easley
Scott Sonnenberg	Easley

SOIL CLASSIFIERS - The SCDNR is responsible for the registration of Professional Soil Classifiers under the authority of the Soil Classifiers Act of 1974, as amended. Currently, 25 professionals are registered in South Carolina. The purpose of the Act, through examination and licensing, is to ensure competence and professionalism in the field of soil classification. Staff conducted the annual registration renewals, assisted the Soil Classifiers Advisory Council, and served as a liaison with other agencies.

SOIL CLASSIFIERS ADVISORY COUNCIL - The Soil Classifiers Advisory Council membership is composed of five registered soil classifiers who are appointed by the SCDNR.

Dennis DeFrancesco	Camden
Richard Scharf	Columbia
John Thorp	Summerville
Bill Smith	Clemson
Ben Stuckey	Columbia

LAW ENFORCEMENT

Law Enforcement Advisory Committee

Thomas W. Miller, Chairman	Anderson
John Jernigan, Vice Chairman	Columbia
William Terry LeCroy, Sr.	Bradley
Yancey A. McLeod, Jr.	Eastover
Knox L. Haynsworth, Jr.	Greenville
David M. Cline	Greenville
David B. Burnside	Hopkins
Coy Johnston	Summerville
Jackie D. Black	Columbia
W. Jeffery Price	Columbia

FIELD OPERATIONS

Department of Natural Resources officers successfully prosecuted 8,051 cases, and an additional 6,059 warning citations were issued. A general breakdown of cases for FY96-97 is as follows:

*Game & Fish	388	Boating	2,474
Saltwater Fisheries	404	WMA Violations	777
**Migratory Birds	523	Turkey	102
Other	757	Warnings	6,059

(Note: *Game & Fish does not include migratory bird or turkey violations. ** Migratory Birds includes: dove, duck and other migratory bird violations)

Officers wrote summonses for the period totaling \$769,051.91 in fines. In addition to issuing summonses, officers were also involved in the following activities: expended 6,568 hours assisting other law enforcement agencies, answered 1,434 nuisance animal complaints, presented 1,976 public programs, issued 1,298 deer depredation permits, coordinated and successfully conducted 14 "Get Hooked on Fishing Not on Drugs" fishing rodeos (attendance ranged from 200 - 2,000 children under the age of 16). The division worked closely with other divisions within the DNR to ensure we are properly educating our constituents and effectively managing our state's natural resources.

Investigations: The Investigations Unit is a combination of the covert operations and marine theft units. This section has a combined total of 9 members who are responsible for the investigation of all types of criminal activity. Additionally, this section collects, analyzes, synthesizes and develops intelligence related to the illegal commercialization of wildlife and fish, archeological theft and vandalism, boat and motor theft and aquaculture. Case activities included: conducting 321 potential criminal investigations which resulted in 13 successfully prosecuted cases involving the unlawful importation/sale of protected wildlife, successfully prosecuted 126 cases for violations of game and fish laws, successfully prosecuted 26 cases for the theft of marine equipment or titling violations and recovered 12 stolen boats and 10 stolen motors valued at \$120,000.00, and produced a 30 minute video outlining the Law Enforcement Division's programs and structure.

Records and Intelligence: This section was created during this fiscal year and is administered by a First Sergeant and an Administrative Specialist. The section's goals are as follows: to establish a central location and repository for all closed law enforcement records, to establish and provide crime analysis for field district investigations and administration, establish a central

location for warrant service coordination in DNR cases and to maintain suspensions and provide lists as enforcement tools for field services and to provide technical support to DNR enforcement officers.

Operation Game Thief: This program is responsible for processing hotline calls received from the public related to wildlife and fish violations. During the fiscal year 1,824 calls were received concerning unlawful acts. Two hundred seventy-seven cases were made as a result of these calls.

K-9 Program: The Canine Team officially began working in the field October 1, 1996. The Team consists of 3 handlers and their canines. Training for the new handlers and their canines is ongoing through the generosity of the Florida Game & Fish Commission. Our goal is to have 1 handler and 1 canine per district. This Team will be utilized for checking hunters, searching for evidence, tracking lost persons and trespassers, and assisting with investigations. They are also responsible for educating constituents through public presentations stressing natural resource stewardship, hunter safety and demonstrating the abilities of the canine. In addition to agency uses, the Team was utilized by other agencies to assist in locating lost children, as well as search for evidence of other crimes. As a result of utilizing canine abilities, evidence was located which may have confirmed a fatal hunting accident. However, because of the use of the canine and other evidence, one person was charged and convicted of murder.

The Team has logged 38 uses with 36 requests from within the DNR, as well as other agencies and public organizations. Of these uses 30 were agency related. The K-9 Team assisted DNR field officers with 23 cases and 7 warnings during this period resulting in \$3,901.00 in fines collected.

MARINE LAW ENFORCEMENT & EDUCATION AFFAIRS

South Carolina is ranked 8th in the country in the number of registered motorboats with 418,000. This number continues to grow each year as more people take to the water for fishing, hunting and recreation. The job responsibilities of this section consist of boating accident investigations, aids to navigation, waterway hazard removal, search and rescue (divers) operations, marine event applications, zoning and regulatory waterway investigations, boating saturation patrols (B-SAF - Boating Safety Action Force), and law enforcement education programs.

Boating Accident Investigation: This area is responsible for processing all boating accident reports, investigating accidents that involve fatalities or serious injuries, and forwarding the information gathered to the United States Coast Guard. Last year, there were one hundred thirty-five (135) boating accident reports reviewed and processed. Included in those reports were twenty (20) fatalities. A study of accident reports reveals that seventy-five percent (75%) of all persons involved in fatal boating accidents have had no formal boating safety training. Therefore, resources will be used to reach those boaters in the field and classroom in an attempt to provide a safer boating environment.

Aids to Navigation: A total of one thousand six hundred (1,600) aids to navigation and regulatory markers are maintained by this section. These buoys mark hazardous sites and regulated areas on the waters of the state and must be inspected on a regular basis. It is the objective of this section to expand the maintenance and inspection program to keep pace with the growth in boating. During 1997, more than five hundred (500) aids to navigation and regulatory markers were replaced and one hundred fifty (150) information signs were distributed. Moreover, routine inspections and verification of positions must be conducted every month.

Zoning Investigations: Zoning investigations are conducted as a result of a formal request from a member of the public, or one of our enforcement officers believes an area needs to be zoned SLOW TO NO WAKE. Section personnel investigate each complaint thoroughly, and zoning is recommended only if other means will not correct the situation. The utilization of

information signs pertaining to wake responsibility in certain area instead of official regulation has been very successful. There were one hundred four (104) investigations this year. These requests are increasing year to year and take up a large portion of the work time.

Hazard Removal: Another area of responsibility is the removal of boating hazards. In this area, divers use a specialized underwater chain saw to remove boating hazards such as stumps and logs. With the removal of these hazards, it is no longer necessary to mark the sites with buoys. This saves on time and monies that would have been spent in the maintenance of hazard markers. During 1997, there were twenty-five (25) hazards removed.

Divers (Search and Rescue): The department's law enforcement dive team is composed of twelve (12) officers from various law enforcement districts. These positions on the dive team are voluntary and involve hundreds of hazardous work hours for these officers each year. The dive team is responsible for searching for drowned persons as well as assisting SLED and other law enforcement agencies search for evidence of a crime that may have been thrown into the water. Last year, the dive team participated in thirty-eight (38) dive assignments.

Marine Events: Authorization to hold approximately four hundred fifty (450) marine events were issued by staff during the year. These events include regattas, boat races, fishing tournaments, parades, etc. For safety reasons, permits are necessary so that multiple events will not be held in the same area or otherwise be unsafe. Staff is responsible for reviewing and authorizing these events.

Boating Saturations (B-SAF): The division's boating safety action force consists of thirteen (13) highly trained boating officers. During 1997, this team was responsible for ten (10) special patrols that resulted in one thousand nine-hundred forty-four (1,944) cases -- (four hundred eighty-seven (487) summons and one thousand four-hundred fifty-seven (1,457) warnings). Special emphasis was placed on Boating Under the Influence (BUI), and negligent operation. These patrols were conducted in high use area. Emphasis is placed on high profile enforcement as well as education through handing out boating safety literature.

Law Enforcement Education: The division's law enforcement education program consists of hunter and boater education. Both of these are mandatory programs under state law. Our education staff is composed of eight (8) full time education officers, one for each inland law enforcement district, plus a statewide coordinator. During 1997, this section reached more than ten thousand (10,000) students in hunter safety and eleven (11,000) students in boater safety.

Conclusion: This section has the responsibility for insuring that the waters of this state are as safe as possible for the recreational boater. Our efficiency and effectiveness can only be measured in how it relates to the continued increase in the number of registered boats over the past years (196,000 in 1982 vs. 418,000 in 1997) as compared to the increase in job tasks. Currently, there are 1,000,000 people that go boating at one time or another during the year. These programs continue to meet and accomplish increased job responsibilities. By actively investigating boating accidents to determine causes in hopes of preventing those types of accidents in the future, by maintaining over one thousand six-hundred (1,600) hazard and regulatory markers and signs, by removing hazards from our waterways, by reviewing over four-hundred fifty (450) marine event applications to insure these events in themselves do not produce boating problems, and by maintaining a very mobile Boating Safety Action Force (B-SAF) team and professional underwater dive team, this section has been effective in completing its job mission of maintaining the safest boating conditions possible.

Staff Operations

Communications and Unusual Occurrences: This section is responsible for overseeing the department's involvement in the State Emergency Preparedness Plan and maintaining the department's statewide Communications Center. Mild winter weather conditions combined with

minimal tropical storm activity in the Atlantic greatly reduced the activities of the State Emergency Operations Center this year. Department EOC personnel were involved in five emergency preparedness training exercises, and fifteen DNR officers participated in a search and rescue training class. In addition to responding to weather related emergencies and associated training events, the Department assisted other state and federal agencies in escorting two trains carrying spent nuclear fuel rods from Charleston to the Savannah River Plant.

The Emergency Preparedness Coordinator attended the National Hurricane Conference in Houston, a multi-jurisdictional search and rescue meeting in Beaufort, a Law Enforcement orientation meeting at the V. C. Summer and Oconee Nuclear Station, and participated in several state and department level training events for emergency preparedness.

The Communication Center provides 24-hour statewide radio and pager service for the department and other state and local users. In addition to normal communications activities, the Communications Center performs a variety of services for Law Enforcement and other divisions of the agency. A new Communications Specialist was hired during the year to provide technical and administrative support for the section. The section is actively involved in several major projects that will greatly impact the operational effectiveness of the program. Construction is presently underway for a new Communications Center to be located at the departments Styx Compound. The facility will provide needed space to incorporate new communications equipment, and will allow for adequate and secure storage for sensitive equipment. The Communications Specialist is working to relocate a major tower/repeater that serves the Charleston area. The relocation project is necessary due to a planned construction project at the Marine Resource Center at Fort Johnson.

Commissions and Legislation: This section is responsible for monitoring legislative efforts of the division, and maintains all law enforcement commissions and administrative records. The Legislative Coordinator tracks all legislation that affects the division, and assists the department in legislative matters. The Legislative Coordinator or designee attended all committee and subcommittee meetings of the General Assembly that addressed legislative matters pertaining to DNR law enforcement activities. The Legislative Coordinator was responsible for updating and issuing a law manual that is specifically designed to be used by DNR Law Enforcement Officers. In addition to distributing the manual to DNR officers, the manual was also distributed to all magistrates.

This section is also responsible for overseeing the sale of forfeited equipment. Sales of forfeited equipment resulted in approximately twenty-four thousand, five hundred dollars to the agency.

Deputy Law Enforcement Officer Program: The Deputy Law Enforcement Officer Program underwent considerable change during this year due to legislation (50-3-315) that took effect on July 1, 1996. As result of the legislative changes, the expanded powers afforded to officers involved in the program combined with increased education and training requirements have helped improve program effectiveness.

As of June 30, 1997, all Deputy Law Enforcement Officers that have successfully met the education, training, and administrative requirements of the program have received their new badges, credentials and other authorized items

Training: This section is responsible for coordinating and conducting all law enforcement related training. In addition, this section maintains training records for all DNR officers, and other department commissioned personnel. The following training activities/programs were conducted over the past fiscal year.

> In-service training for 250 law enforcement officers was conducted over a five week period of time. (Training consisted of: firearms recertification, precision driving recertification,

First Aid and CPR training, legal up-date, update on laws affecting boating, and emergency preparedness).

- > In addition to firearms recertification at in-service training, bi-annual firearms recertification training was conducted for 250 DNR officers. Officers fired shotguns and pistols on a combat course which required them to move from station-to-station and make shoot - don't shoot decisions.

- > More than two hundred applicants were tested (physical agility test) for seven DNR law enforcement positions.

- > A five week DNR Basic Law Enforcement Training program was conducted for new officers.

- > A two week "Special Basic Course" for new Deputy Law Enforcement Officers was conducted.

- > A Deputy Law Enforcement Officer in-service class was conducted for department and non-department personnel.

- > All Firearms Instructors (ten officers) attended a Glock Armorer school for recertification.

- > Training Officer is responsible for coordinating department activities in support of the Cadet Law Enforcement Academy. The week long Academy held at the South Carolina Criminal Justice Academy is open to rising high school seniors who have an interest in careers in law enforcement.

Aviation: The basic mission of the Aviation Section is to provide 24-hour aviation support to the Department and other State, Federal, City, and County agencies requesting assistance. The section consist of a chief pilot, two full-time pilots, and one part-time pilot. Aviation operations are primarily based out of the Columbia Metropolitan Airport, with an additional aircraft located in the Florence area. Aircraft operated by the section include: One McDonnell Douglas 500 helicopter with F.L.I.R capability; one twin-engine (Aero Commander); and three single engine aircraft (two Cessna's and one Champion Citabria). The mission responsibilities of the Aviation Section include: Search and Rescue missions, DNR law enforcement patrols (inland and coastal enforcement), aerial surveys and assessments for other divisions, aerial fish restocking programs, supporting other law enforcement agencies on manhunts, aerial photography, and other special flight needs as requested.

<u>Aircraft Type</u>	<u>Number of Flights</u>	<u>Flight Hours</u>
Helicopter	97	345.8
Cessna 180	74	339.1
Cessna 206	99	228.3
Aero Commander	70	237.1
Citabria	40	84.7
Total	380	1235.0

DIVISION OF MARINE RESOURCES

The Division of Marine Resources is responsible for the conservation, protection and wise use of the state's marine resources through efforts in research, management and public education. The Division addresses coastal issues by conducting projects to analyze conditions in the commercial and recreational fisheries and the habitats upon which these fisheries depend. The Division explores new and promising fishing technologies for new and expanded fisheries and actively investigates environmental and ecological concerns. The Division also conducts ongoing research to fulfill the goal of fostering a seafood farming industry throughout the state's coastal area through programs at the James M. Waddell Mariculture Research and Development Center and serves as the state's mission-oriented research facility in the area of marine resources in general.

Marine Resources Advisory Committee

Mary Pope M. H. Waring, Chair.....	Charleston
William L. Hiott, Vice Chairman.....	Charleston
I. Jenkins Mikell, Jr.	Columbia
Charles W. Stone.....	Murrells Inlet
Micah J. LaRoche, III.....	Wadmalaw Island
Porter B. Rose.....	Greenville
Albert L. Segars, Jr.	Beaufort
Willie C. Shelley, Jr.	Murrells Inlet
Frances F. Limehouse.....	Charleston
Mitchell Sidney Scott.....	Allendale

Marine Recreational Fisheries Advisory Committee

Mary Pope M. H. Waring (DNR Board).....	Charleston
Peter Dodds, Chairman.....	Mt. Pleasant
Marion R. "Spike" Simmons, Vice Chairman.....	Walterboro
Collins Doughtie.....	Hilton Head
William E. Whitley.....	Hanahan
Stuart Ballard.....	Georgetown
Willie C. Shelley, Jr.	Murrells Inlet
Stephen L. Chryst.....	Myrtle Beach

S.C. Governor's Cup Billfishing Series Advisory Board

William B. Cox, Jr.	Orangeburg
James C. Benton.....	Myrtle Beach
J. Egerton Burroughs.....	Surfside Beach
Edgar A. Buck.....	Charleston
E. Thomas Byrd, Jr.	Isle of Palms
David M. Cline.....	Greenville
G. Manly Eubank.....	Charleston
Robert H. Hood.....	Charleston
E. L. Pooser.....	Columbia
Paul R. Rabe.....	Waukegan, IL
T. Smith Ragsdale, III.....	Conway
Gov. Carroll A. Campbell, Jr.	Washington
William R. Jennings.....	Columbia
Dr. Paul A. Sandifer.....	Columbia
Dr. John V. Miglarese.....	Charleston

COASTAL INFORMATION EDUCATION & COMMUNICATIONS OFFICE

This office provides broad based informational, educational and public affairs support to all agency coastal programs and activities, including those of the Division of Marine Resources, Division of Conservation Education and Communications and the Division of Law Enforcement and Boating. Support includes production of news releases, coordination of media relations, the production of special publications, writing SCW magazine articles, dispensing public information, conducting Center based tours and educational cruises, performing educational outreach activities, development of interpretive literature and facilities, field editing of the agency's semiannual newspaper, conducting special agency functions and other appropriate activities. It is also the mission of the Coastal Information Education and Communications Office to inform and educate the citizens of South Carolina about:

- the tremendous ecological diversity and economical value of South Carolina's natural coastal resources
- what the Agency is doing to better understand, manage and conserve these resources
- the expertise we use in our management and research endeavors and
- what user groups can do to protect and conserve these resources.

During the year, the information desk received hundreds of telephone calls from the public requesting information on a wide range of topics, including hunting and fishing information, regulations, conservation inquiries, referrals for wildlife assistance and educational activities to name a few. The information desk also served as backup for the central switchboard for handling and routing calls when an immediate referral was not known to the switchboard operator.

In an effort to improve communications throughout the Division, the office continued to produce a monthly in-house newsletter entitled "Marine Update" which highlights ongoing program activities, progress reports, new projects, new legislation, priority issues, important meetings, budget concerns, etc. This approach to "improved communications" has been extremely popular with staff at all levels throughout the Division.

The office processed more than 60 press releases during the reporting period, covering Marine Resources Division activities and Law Enforcement Marine Patrol. Releases focused on the artificial reef program, fish tagging program, research activities, environmental issues, recreational fishing opportunities, commercial fisheries production, the Governor's Cup Billfishing Series, public education activities and the like. Coverage also included stories announcing various fishing season openings, public meetings, seminars, regulations and other routine topics. In addition, the news desk routinely assisted with reporting project activities of the Law Enforcement Marine Patrol.

During the year, a series of news features were prepared and distributed to coastal newspapers including the Hilton Head Island Packet, the Beaufort Gazette, the Charleston Post and Courier, the James Island Journal, the Moultrie News, the Georgetown Times and the Myrtle Beach Sun News. This effort represented a continued commitment from FY 1995-1996 which proved extremely popular. Features go into more depth and detail than a regular story and are very effective in providing information to the public on more complex issues.

During the year, considerable progress was made in getting local television coverage on a number of marine related topics including the red drum tagging program, horseshoe crabs, sharks, the MRD educational cruise program, artificial reefs, public oyster grounds and the like.

1997 marked the 25th Anniversary of the creation of the Marine Division at Ft. Johnson. Accordingly, a number of activities for staff and the public were planned and conducted during the year. In May, a major open house event was held to celebrate the many accomplishments that had been made since 1972. Attendance for the event included dignitaries, board members, advisory committee members, past and present MRD employees and special guests. In addition, an historical document summarizing the activities of the MRD over the past 25 years was nearing

completion. The document, funded by the South Carolina Sea Grant Consortium will serve as an invaluable reference source for information on the Division in the future.

During the year, office staff continued to coordinate the Marine Division Speakers Bureau involving programs and presentations across the state. Our greatest efforts were concentrated in the coastal area especially in response to various conservation organizations, fishing clubs, environmental groups, schools, colleges and universities. This effort has proven to be very effective in promoting the overall goals of the Division, encouraging conservation through diverse audiences and highlighting resource related issues and problems.

Marine Education

During FY 1996-1997 approximately 16,000 students, teachers, coastal managers and scientists participated in the Division's Marine Education Program's educational tours, cruises, classroom programs and special events. Participants came from throughout the state as well as from other states and countries. Approximately 120 educational cruises and 90 classroom programs were conducted providing a hands-on experience to students and teachers which, in many cases, represented their first experience with the marine environment. Topics such as marine conservation, wetlands, water quality, estuarine environments, and the role of the Division in research and management of the state's marine ecosystems were covered during these programs.

Eight teacher workshops were performed reaching some 280 teachers from around the state. Outreach programs to area schools, teacher groups and civic organizations included touch tank classes, estuarine programs and classes dealing with set-up and maintenance of saltwater aquaria. In addition, new equipment was purchased for the MRRI classroom from funds provided by US Fish and Wildlife and Harry Hampton to further enhance programs on site.

The Marine Education Program was also responsible for coordinating large outreach programs including the Myrtle Beach Wildlife Expo, Southeastern Wildlife Expo, Berkeley Kids Who Care, Palmetto Sportsman's Classic, Coastweeks, and the Folly Beach Sea and Sand Festival.

A major camp program "A Carolina Coastal Adventure" in cooperation with the Land Resources Division was planned which will provide further opportunity for students to gain a better understanding of the marine environment and the activities of the Marine Division that protect this environment and the methods of planning for coastal growth. Funding was also used to conduct a third "Students Teaching Students" program. Students from throughout the state were selected and given a one week course in coastal wetlands throughout the coastal zone. Planning also continued for the MRD 25th Anniversary Celebration which will include a live broadcast on South Carolina Educational Television (ETV).

The ACE Basin NERR continued education efforts by sponsoring outreach programs and workshops centered in Colleton County. Approximately 1300 persons participated in programs held on site in the NERR with another 5000 reached through outreach efforts. A continuing program featuring activities for families was started in cooperation with the Edisto Beach State Park and took place on selected weekends throughout the summer. Response to this program was outstanding and plans are being made to continue this program in the upcoming year.

The ACE Basin NERR also was the recipient of two federal grant awards for education. One award was given to further translation of research performed in the NERR to a variety of audiences through presentations and publications. The second was a competitive award given to the ACE Basin to survey visitor needs and target audiences for the entire NERR system.

COASTAL OUTREACH AND RESERVES PROGRAM

The Coastal Reserves and Outreach Program is responsible for coordinating and conducting division-level programs involving input from research and management units, providing field support in the outlying regions and managing representative coastal habitats through linked

programs of stewardship, public education and scientific understanding.

Marine biologists in Charleston, Beaufort and Georgetown continued to provide information and assistance to marine resource user-groups. Assessment of marine resources needs, problems and issues were made in coordination with law enforcement and MRD staff in each of the regions. During this fiscal year, staff provided information to enable fishermen to legally and successfully participate in commercial and recreational fisheries. The regional biologists responded to inquiries concerning laws and regulations, access points, resources availability, harvesting techniques, and gear technology. Special efforts were made to coordinate all activities with District Nine Law Enforcement. Field support for other division projects and state/federal cooperative research was also provided.

The program continued to implement coastal management plans, acquire key coastal lands and wetlands, and provide on-site management for these properties. Activities continued on Capers Island, a SC Heritage Trust property and a component of the International Man and the Biosphere Program. During this fiscal year, approximately 1,059 persons camped overnight on Capers Island. The average length of stay was three days and two nights. An estimated 1,005 students, teachers, and the general public visited the island. Maintenance continued on roads and trails, docks, impoundment dikes, and headquarters facilities.

The ACE Basin National Estuarine Research Reserve continued in its fifth full year of funding through NOAA under the 1972 CZMA, as amended. This program is part of a national network of state owned and managed coastal protected areas to promote informed management of the nation's estuarine and coastal habitats. The Bennett's Point Field Station continued to serve as the primary platform for staging research and education activities in the reserve. The reserve has become an effective catalyst for local, regional, state, and federal partnerships and programs to address coastal management issues. It is also participating in a number of research, monitoring and educational activities on a national scale as well as at the state and local levels. Plans are being made to develop a research center at the Bennett's Point property. This will be part of a long-term plan for sustainable economic development in Colleton County.

PERSONNEL

This office is a satellite of the Columbia Personnel Office. The primary responsibility of this office is to insure the correct implementation of policies and procedures of the Department at the Division level and other Department components as needed.

This office has the responsibility of assisting Division staff with all personnel matters which includes new employee orientation, benefits, disciplinary actions, counseling, referrals, travel arrangements, processing personnel changes, hiring, terminations, recruitment, training and promoting affirmative action.

VESSEL OPERATIONS

Four ocean-going research vessels support research and management investigations of the Division. The R/V Palmetto is a 110' vessel that supports offshore projects. The R/V Lady Lisa is a 70' St. Augustine trawler that works in bays and sounds and near offshore areas. The R/V Carolina Pride and R/V Anita supports inshore projects.

All vessels have trawl capabilities and are able to support extended cruises. Each vessel is manned by U.S. Coast Guard licensed captains. Division vessels support various federal and state agencies with vessel needs as well as academic institutions in their education efforts.

Table 1. Fishers Licenses Issued during FY 1996 and 1997

	FY 1996	FY 1997
Trawler	793 (540 res 253 n-res)	887 (558 res 329 n-res)
Boats to 18'	944	902
Boats over 18'	230	229
Wholesale Dealers	293	257
Land & Sell	665	590
Bait Dealer	105	86
Crab Pots	429	428
Miscellaneous Pots	8	8
Channel Nets	60	60
Shad Nets	823	903
Gill Nets	538	520
Miscellaneous Nets	7	7
Seine Nets	56	45
Shellfish Dredge	12	12
Shellfish Tongs	61	52
Shellfish Forks	36	34
Shellfish Rakes	212	172
Shellfish	292	272
Trawler Captain	902 (632 res 270 n-res)	988 (636 res 352 n-res)
Peeler Crab	27	20
Other	469	286

Table 2. Revenue Collected by the License Office During FY 1996 and 1997

Licenses	\$262,849.91	\$284,557.64
Fines	31,038.78	26,295.42
Rent	25,814.80	28,389.39
Sale of Goods	12,113.15	7,852.80
Total	\$331,816.64	\$347,095.25
Shrimp Baiting	\$353,599.00	\$359,092.00

OFFICE OF FISHERIES MANAGEMENT

The Office of Fisheries Management (OFM) is responsible for proper management of the state's living marine resources and their associated habitats, while considering the economic and social benefits which these resources provide, and the equitable utilization of fishery resources. This responsibility includes the regulation of fishing seasons, areas and methods, issuance of experimental, scientific and commercial fishing permits, management of public shellfish grounds and maintaining statistical records of various fisheries. The OFM is also quite active in conducting resource assessments and surveys in a broad spectrum of environmental areas related to the protection and enhancement of coastal fisheries habitat.

The OFM works closely with other units within the Division, the Coastal Environmental Enforcement District and various state and federal agencies. The Director of this office serves as the designated state official to the South Atlantic Fishery Management Council and as a Commissioner to the Atlantic States Marine Fisheries Commission. The OFM also maintains close contact with the South Carolina Legislature in making recommendations relating to fisheries laws and regulations. Various informational and advisory services related to commercial and recreational fisheries are also provided to the public. The following is a summary of the activities and projects of the OFM during FY 1996-1997.

OFM ADMINISTRATIVE OFFICE

Recreational Fisheries Conservation and Management Act of 1991 - The sixth S.C. Marine Recreational Fisheries Stamp Art Contest was held on August 3, 1996. The contest received entries from 24 artists. During 1996/97 approximately 87,470 saltwater stamps were sold to saltwater fishermen, generating over \$442,350. With the help of the Marine Recreational Fisheries Advisory Board, these monies were dispersed to a number of different recreational fisheries development, management and research projects and will help support coastal law enforcement efforts. The annual Marine Recreational Fisheries Stamp Program Report was prepared and distributed.

Legislative Assistance - During the year, OFM staff assisted legislative committees and members of the General Assembly with the development of legislation important to coastal fisheries. Proposed legislation that was prepared, reviewed, and discussed in public forum and passed into law included: a proposal to establish a possession limit on shrimp during the winter; a proposal to require TED's in channel nets and new requirements pertaining to the blue crab fishery. New issues that were addressed during this period dealt with revision of bag and size limits for spotted seatrout and size limits for black sea bass; revision of Chapter 17; regulations pertaining to the importation of non-indigenous shrimp for mariculture purposes and a moratorium on the sale of commercial shrimp trawl licenses.

Permit Administration - It is the function of the Fisheries Permitting and Special Projects Section within the Office of Fisheries Management to administer the Department's statutory and regulatory authority to permit effort to harvest marine resources. Falling into four general categories of harvest allowance, private management, importation, and experimental, a total of 6,323 permits were issued during FY 1996-1997.

FISHERIES STATISTICS SECTION

The Fisheries Statistics Section (FSS) consists of commercial and recreational data collection groups supervised by a Section Leader. The commercial section obtained commercial fisheries catch and effort data via a mandatory report submitted by 293 wholesale and shellfish dealers, voluntary weekly shrimp tickets collected from 19 major dealers, voluntary fish trip tickets submitted by 7 dealers, and landings reports required from participants in several special permitted fisheries (channel net, whelk and horseshoe crab trawl, and shellfish escalator, among others). Shrimp size and species distributions were obtained via routine visits to shrimp dealers during the trawl season. During the performance period, 190 offshore finfish trips were sampled for

length frequency distribution, accounting for 19,847 measurements of priority species. Employment and market information was obtained from wholesale dealers via an annual survey.

The State Finfish Survey's (SFS) intercept and target species measurement quotas were revised for 1997, reflecting a more intense focus on the geographical distribution of the recreational catch. Recreational catch and effort data was collected via the SFS under the revised guidelines from 1 January 1997 - 30 June 1997. During this performance period, 767 SFS interviews were obtained representing contact with 1,654 anglers most of whom were in private boats. The target species during the period included spottail bass, spotted seatrout, sheepshead as well as southern and summer flounder. The measurement quota for the combined target species was set at 565 for the period. A total of 1,339 individual target species measurements were collected, exceeding the quota by 237%. SFS data was edited and key entered in-house and updated to in-house databases. Monthly summaries and wave-end summaries were generated and distributed.

Trip reports were submitted by 18 headboats and 171 charter vessels. Charter vessel trip reports were coded, key entered, edited and archived. Monthly summaries were generated. Mandatory monthly pier activity summary reports were received from 10 public fishing piers for this performance period. Monthly angler activity for each pier was key entered and summary reports generated.

Commercial fisheries data was transmitted to the NMFS regional files. South Carolina remains the only state in the Southeast to meet all monthly and yearly batch submission deadlines ahead of schedule. Report submission from obligated providers was monitored. When necessary, delinquent letters were mailed to providers and affidavits were generated and forwarded to SCDNR District Nine Law Enforcement for appropriate action. FSS staff supported DNR Law Enforcement officers in court on numerous cases.

Approximately 138 data requests for both commercial and recreational fisheries data were received and processed. Requests were answered from a variety of sources, including DNR staff, the media, academia, other governmental agencies, and private citizens.

Constituent liaison was maintained and enhanced. Both recreational and commercial entities were apprised of information from the NMFS, the South Atlantic Fisheries Management Council, and the Atlantic States Marine Fisheries Commission (ASMFC). The FSS Section Leader served as South Carolina's representative to and Chairman of the ASMFC's South Atlantic Statistics Committee and as Chairman of the Southeast Commercial Fisheries Information Network (ComFIN), and as the South Carolina representative to the Southeast's Recreational Fisheries Information Network (RecFIN(SE)).

CRUSTACEAN MANAGEMENT SECTION

The Crustacean Management Program (CMP) is primarily responsible for the management of the shrimp and blue crab fisheries of South Carolina. This management includes monitoring and assessment of stocks including participation in applied research projects. Staff also make numerous educational presentations and provide general information to the public.

Postlarval Shrimp Survey - Plankton samples were taken at Breach Inlet located between the Isle of Palms and Sullivan's Island. Samples have been taken at this location since 1974 to provide an early index of postlarval shrimp recruitment to the estuaries. During winter and spring 1997, average numbers of postlarval brown shrimp were found in samples. Later sampling indicated that the majority of white shrimp postlarvae recruited in June of 1997, in above average numbers.

Juvenile Shrimp and Blue Crab Sampling - Tidal creeks are sampled weekly during spring and summer for juvenile shrimp and blue crab. This work is directed towards making an early determination of the abundance and size of shrimp. Sampling in July-September of 1996 indicated above average numbers of juvenile white shrimp in the tidal creeks near Charleston. Creek

sampling for juvenile brown shrimp in May and June 1997 produced average numbers of juvenile brown shrimp, at normal sizes for that time of year. Blue crab appeared to be above average in number.

Subadult and Adult Shrimp and Blue Crab Sampling - The Research Vessel Carolina Pride is used to monitor shrimp and blue crab on a routine basis in the State's coastal waters. Catches of white roe shrimp were above average near Charleston, but below average in the extreme southern part of the state. The commercial trawl season was opened on May 14, based on the appearance of many shrimp that appeared to have spawned. Landings for this part of the season exceeded 400,000 lb., much better than the previous year (~60,000 lb.). Major recruitment of young white shrimp occurred between 1-6 weeks after this time.

Brown shrimp catches were about average in research trawls in 1997, but commercial catches were lower than average through late June, due in part to unusually cool weather in May and June. Numbers of blue crab captured by research trawls were about average in spring of 1997. The Channel Net season opened in early September of 1996, closed after five days due to flushing of Winyah and N. Santee Bays by hurricanes, then reopened in November. Landings for this fishery were approximately 100,000 lb. of small shrimp. The shrimp baiting season opened on 13 September 1996 and closed on 11 November. This season produced a below average harvest, due to cold winter temperatures that reduced the number of spawning white shrimp in 1996. Over 14,000 permitted baiters landed approximately one million pounds of shrimp. The commercial trawlers landed slightly over two million pounds of white shrimp in the fall of 1996, somewhat below average.

Blue Crab Potting Surveys - A fishery-independent survey of blue crab stocks has been conducted by staff since 1988 in which crab traps are fished in a standardized manner in each of the State's major estuaries. Catch rates through the first nine years of the survey have suggested relatively stable stocks of blue crab. Catch rates in 1996 continued less than average, perhaps a reflection of increased competition from commercial potting in some areas. Preliminary analyses suggests a negative correlation between research trawl catches and potting data in some areas.

Educational Displays - During the year, staff participated in numerous public education demonstrations. Staff made presentations at public meetings for commercial fishermen, the SCDNR Marine Advisory Committee, and the SCDNR Board concerning changes in blue crab regulations and the rewrite of marine laws.

FINFISH MANAGEMENT SECTION

The Finfish Management Section (FMS) is concerned with the management and development of South Carolina's marine finfish resources. During the past fiscal year this program carried out a number of State funded projects as well as Federally funded projects which are described below.

Anadromous Fish Project - Major activities in the NMFS-funded Anadromous Project during the FY 1996-1997 have been the completion of a fourth year tagging study on American shad in the Edisto River and a continuing second year of tagging sturgeon in the lower Edisto. Results of the 1997 tagging study, in conjunction with those from similar studies in 1994 through 1996, and commercial catch and effort records, indicate potential improvement in the status of the Edisto shad population. Sturgeon tagging has yielded excellent growth and movement information on juvenile Atlantic sturgeon and, to a lesser extent, on adult shortnose sturgeon.

Small Coastal Shark Project - A proposal to study small coastal species of sharks was funded by the Inter-jurisdictional Fisheries Program and sampling was initiated in August 1995. Sharks are being tagged and released to provide information on exploitation rates and migratory behavior.

Red Drum Project - This project, funded by the Marine Recreational Stamp Program is directed at evaluating methods of sampling adult red drum in coastal waters and characterizing

these populations. In 1996 a small sample of fish that were 37 inches in total length were sacrificed for age determination and spawning condition evaluation. Fin clip samples were taken from a sample of fish for potential mtDNA stock identification studies of the offshore populations. During the fall of 1996, longline sampling produced 312 adult red drum. Results from this work were presented at the annual red drum workshop held in Brunswick Ga. In March, 1997. Sampling of coastal red drum populations will be continued during the fall of 1997.

Marine Game Fish Tagging Project - Over 11,370 fish were tagged by over 1,100 participating anglers. Approximately 2,000 tag kits were issued. During the fiscal year, anglers tagged 65 target species and 15 non-target species. Non-target species made up less than 0.5% of the total fish tagged. Seven of the top ten anglers tagging the most fish during the year were charter or commercial boat captains. An angler newsletter summarizing 1996 activity in the tagging program was distributed to all who participated during the year.

During the year, 550 anglers reported the recapture of 1050 tagged fish. The recapture rate of warsaw grouper remained high at 70.8%. Other fish associated with the snapper/grouper complex also exhibited high recapture rates. Many tagged fish were recovered after traveling long distances. A white marlin tagged off Charleston was recaptured 39 days later off Rhode Island, a minimum distance of 740 nautical miles. A cobia tagged at Sebastian Inlet, FL was recaptured 950 nautical miles away at Manasquan, NJ. A 17" gag tagged off Hilton Head was recaptured at St. Augustine, FL. Two flounder tagged in South Carolina were recaptured at Cape Canaveral. Two barracuda were recaptured at the Dry Tortugas and Cuba.

Master Angler Project - This program was initiated in 1987 to provide recognition to anglers who catch trophy fish and to those anglers who practice conservation through the tag and release of game fish. During FY1996-1997, fifty-eight anglers qualified for certificates in the citation fish division. Conservation certificates were awarded to sixty-eight anglers who tagged and released at least thirty fish.

State Record Project - Records are currently maintained on sixty-nine species of marine gamefish available to South Carolina anglers. The following applications were accepted:

FISH	WEIGHT	PORT	DATE	ANGLER
Gag grouper	48-8	Mt.Pleasant	5/97	Ron Price
African Pompano	35-8	Mt.Pleasant	5/97	M. Wireman

Sportfishing Tournament Project - FY 1996-1997 saw 58 competitions held along the coast which ranged in size from 10 to over 200 boats. Section personnel continued working closely with tournament organizers in planning and scheduling their events. State certified weighing scales were provided to 23 of these event. The oceanic pelagic gamefish monitoring project was expanded in 1993 to include primary coastal pelagic gamefish of special management concern. This catch per unit effort survey was carried out at 14 sportfishing tournaments (primarily billfish and king mackerel tournaments) during FY 1996-1997.

South Carolina Governor's Cup Billfishing Series Project - Established by Governor Campbell and assigned to the DNR by Governor David M. Beasley, this program has continued to flourish. The 1997 program was comprised of the six major billfish tournaments held May through July plus an interstate competition with North Carolina's Governor's Cup winners. These events emphasize tag and release to minimize the harvest of billfish. Promotions of the program were significantly expanded through the creation of an annual college research grant and an incentive award to get tuna, dolphin and wahoo tagged for science.

A total of 106 different sportfishing boats from as far away as Ponce Inlet, Florida and Wilmington, Delaware participated in the Series. The concept of conserving our billfish resources carried over into everyday fishing with over 90 percent of the all billfish caught in FY 1996-1997

being released. Primarily private funds and grants were used to finance the program. The program received over \$43,000 in private donations and financial assistance for the 1997 program. The 1997 series raised an additional \$9,560 for special marine fisheries conservation work.

Billfish Survey Project - A total of 239 billfish (blue marlin, white marlin, sailfish, long bill spearfish and swordfish) were reported landed and released off South Carolina during FY 1996-1997. Sportfishermen's concern over a perceived worldwide decline in billfish stocks resulted in 217, or 91%, being released. Eight-eight percent of these were tagged before being released.

Marine Artificial Reef Program - During FY 1996-1997, all privately maintained aids to navigation on artificial reef and wreck sites were inspected. Twenty new buoys were deployed on new and existing reef sites. Twenty-four separate offshore field trips resulted in a total of 32 days of monitoring activities on the state's marine artificial reefs. Physical stability, structural integrity, and biological effectiveness of individual materials were assessed through diver observations, side scan sonar, and hull mounted sonar. Side scan and hull mounted sonar assessments were utilized on all reef sites on which new construction took place in order to establish precise locations and relative lay-out of all materials on the sites. The process of converting reef material positions from Loran-C to GPS was completed.

A total of 84 SCUBA dives were conducted throughout the year on reef sites ranging from <10 to 110 feet of water. During diving activities samples of sessile and motile organisms were collected from several reefs constructed from ex-military vessels to test for the possible bio-accumulation of PCBs and heavy metals from these vessels. Test results indicated no increased levels of these substances on any artificial reef site.

Information on South Carolina's system of artificial reefs was provided to the general public through numerous news releases and feature news stories, television appearances, and public presentations. Several hundred phone and mail requests for reef locations or condition reports were also responded to through the distribution of updated reef maps and Loran and GPS listings.

During FY 1996-1997, thirteen separate artificial reef construction projects were completed on ten different permitted reef sites. Site selection surveys were completed and permits were obtained for two additional reef construction sites.

In addition to artificial reef monitoring and construction activities, reef program personnel were instrumental in coordinating and conducting a search for a downed aircraft off the South Carolina coast. Program staff used side scan sonar to locate the wreckage of the downed plane and SCUBA divers were deployed to confirm the identity of the aircraft.

ECONOMIC ANALYSIS AND SEAFOOD MARKETING SECTION

The overall goal of this Section is to apply economic analysis techniques to appropriate public and private sector issues in the coastal area and to maintain the Division's commitment of providing South Carolina's seafood producers and consumers with practical market information.

Commercial Fisheries - A U.S. Department of Commerce MARFIN proposal, "Socio-Demographic Assessment of Commercial Reef Fishermen in the South Atlantic," was completed in the Fall of 1996. The proposal focused on providing socio-demographic data on commercial reef fishers needed to evaluate the potential impact of management alternative by the South Atlantic Fishery Management Council (SAFMC) and the National Marine Fisheries Service (NMFS). This project included research by Clemson University sociologist at the Strom Thurmond Institute (STI). Project activities in 1996 included the completion of in-person interviews and preparation of the final project report in conjunction with STI. Data collected during this project has been used by the SAFMC when preparing fishery management plans. In conjunction with an NMFS economist, Dr. James Waters, a technical report is being prepared entitled, "An Economic Survey of Commercial Reef Fish Boats Along the U.S. South Atlantic Coast." The report, co-authored

by R. Rhodes, W. Waltz, and R. Wiggers, summaries the results of a 1994 survey designed to provide economic information about the financial status of commercial snapper-grouper boats with home ports between Dare County, North Carolina, and Dade County, Florida.

Recreational Fisheries - A survey to determine the economic impact of saltwater anglers using headboats (aka party boats), charter boats and fee-based fishing piers was completed during 1996. Three methods of data collection were used which resulted in over 7,000 angler questionnaires being collected. A preliminary economic impact analysis indicates that charter, headboat, and pier anglers had a total coastal economic impact (i.e. total output effect) of \$45.8 million in 1996. Data from this survey will also be used with other information to forecast future demand for recreational fishing services and related services in South Carolina's coastal area.

In 1997, work was begun to estimate the economic impact of private boat and fishing tournament anglers in South Carolina. After pretesting activities, the first wave of five telephone surveys of private boat anglers using a Clemson University computer assisted telephone interviewing facility was implemented in May, 1997. In addition, twenty-three (23) private boat anglers recruited for a fishing expense diary program were mailed diary booklets to keep during the 1997 fishing season.

The collection of data to estimate the economic impact of saltwater fishing tournaments in South Carolina including the SC Governor's Cup Billfishing Series was also implemented in 1997. Kim Iverson served as the coordinator for collecting data at tournament sites. By the end of June, 1997, data had been collected from 9 of the 18 saltwater tournaments scheduled for coverage.

Seafood Marketing - The Section remains a primary source of marketing information for in-state seafood dealers, processors, wholesalers and retailers, as well as a contact point for out-of-state suppliers, buyers and prospective dealers. It is also a readily available "answer line" for consumers with questions about seafood. The 1997-1998 Seafood Suppliers Directory was completed and has been sent to many out-of-state wholesalers requesting information on South Carolina seafood suppliers. In addition, a seafood marketing and nutrition workshop co-sponsored by Clemson Extension Service/SC Sea Grant was conducted on April 28, 1997. The workshop was oriented toward the Dietetic Internship Program at the Medical University of South Carolina.

Other Projects and Activities - Kim Iverson organized evening briefing sessions for headboat and charter captains in Charleston (the MRRI Auditorium, January 23, 1997), Hilton Head (January 28), and Murrells Inlet (February 4) and attended the several sessions of the SAFMC during FY 1996-1997. Ray Rhodes presented a paper at the World Aquaculture Society Conference during February on the costs and benefits of using polyculture to make commercial aquaculture more environmentally friendly. Rhodes was also scheduled to brief the SAFMC's Snapper Group Committee during August, 1997, on the Section's recreational fishing economic impact research.

ENVIRONMENTAL EVALUATIONS SECTION

The primary function of the Environmental Evaluations Section (EES) is to investigate, monitor and report on changes and alterations from both natural processes and human activity within South Carolina's coastal and marine environment. Permit applications and requests for comments to federal and state regulatory agencies which involve biological, physical and chemical alterations to marine, estuarine, and freshwater wetland and aquatic habitats are continually reviewed by EES biologists. These agencies include the U.S. Army Corps of Engineers (USACOE), the U.S. Coast Guard (USCG), and the S.C. Department of Health and Environmental Control including the Office of Ocean and Coastal Resource Management (SCDHEC/OCRM; formerly the S.C. Coastal Council, SCCC). Comments from these reviews are drafted by EES staff and, after appropriate Division internal review, are forwarded through the DNR Coastal Environmental Coordinator to the DNR Director for Environmental Programs for inclusion into a single Department

response for each application and certification request.

Other activities of the EES include the preparation of resource inventories and assessments; the review of federal and state environmental impact statements (EIS's) and environmental assessments (EA's), and detailed reports required of more complex proposed alterations; investigations of spills and discharges of toxic materials and contaminants, fish kills and other impacts related to maintenance of high water quality; participation in Natural Resource Trustee issues on contaminated sites; assistance in field sampling efforts for ongoing studies of the Environmental Studies Section of MRRI, as well as other agencies; and participation on numerous committees and task forces related to environmental impacts.

During FY 1996-1997, the EES reviewed and commented on approximately 1500 SCDHEC/OCRM, USACOE, and USCG permit applications and certifications for various construction activities and alterations in coastal wetlands and estuarine and marine waters of South Carolina. Additionally, approximately 200 responses to other requests by many of the same state and federal environmental quality agencies for programs (SCDHEC NPDES permit applications, state clearinghouse reviews, etc.) were also processed. These additional requirements brought the total of EES reviews and reports to approximately 1,700 for this year.

As the number of wetland permit requests increases, so does the need for appropriate and effective mitigation of impacts to wetland and aquatic habitat. EES staff have participated in numerous activities regarding mitigation and mitigation banking. In February of 1995, a process was initiated to develop statewide guidance on the establishment and operation of mitigation banks in South Carolina. The outcome of these efforts was the development of a document entitled "Joint State/Federal Administrative Procedures for the Establishment and Operation of Mitigation Banks in South Carolina. An interagency group of federal, state, and local regulatory and resource agencies known as the Mitigation Banking Review Team (MBRT) was also established. An EES staff member has been designated as the SCNDR team representative and plays an active role in all MBRT functions. To date, the MBRT has approved several banks statewide. And additional banks are currently under review. The MBRT has developed specific guidance on a number of issues, including bank siting, standards for establishing credits and debits, and the use of preservation banking.

EES personnel participated in numerous activities related to oil and hazardous material spill planning and response during FY 1996-1997. These activities included active participation on the Area Response Committees (ARC's) established by the U.S. Coast Guard pursuant to the Oil Pollution Act of 1990 (OPA 90) for both Charleston and Savannah; participation in comprehensive intensive oil spill response drills for all responders in the Charleston area; and participation on the Liquid Spillage Control Committee for Charleston Harbor. Additionally, EES personnel received notification of and responded to several minor coastal spill events, none of which resulted in natural resource injury sufficient to warrant formal damage assessment or compensation.

During FY 1996-1997, EES personnel cooperated with the South Carolina Department of Health and Environmental Control (SCDHEC) in the investigation of several seasonal fish kills caused by low dissolved oxygen levels, usually resulting from algal blooms or the decomposition plant matter following the application of aquatic herbicides. Many of these kills occurred in ponds constructed as part of stormwater management systems in residential subdivisions or resort areas. Efforts continue to determine more effective ways to address this problem. The interagency Coastal Pesticide Advisory Committee (CPAC), continued to function successfully, meeting bi-monthly and working toward the common goal of protecting coastal resources through efficient pest management in South Carolina's coastal zone. This committee is recognized both within and outside of South Carolina by regulatory and resource agencies, as well as private enterprise, as a very effective management tool.

In FY 1996-1997, EES personnel continued their participation in a variety of issues being

addressed collectively by representatives of State (SCDNR, SCDHEC, and the Governor's Office) and Federal (USFWS and NOAA) Natural Resource Trustee agencies (NRT's). These activities included the review of documents (work plans, site investigations, remedial investigations, feasibility studies, etc.) and participation in site visits to several existing and proposed Superfund sites in the coastal zone and inland areas. These sites include the Wamchem Superfund Site in Beaufort, the Helena Chemical Company Superfund Site in Fairfax, and, in Charleston, the Koppers Superfund Site, the Calhoun Park Site, and the National Park Service Site (S.C. Aquarium). EES personnel also are participating in the planning process for environmental clean-up activities at Naval Base Charleston.

EES personnel continued to provide technical support to the South Atlantic Fishery Management Council through participation on the Habitat and Environmental Protection Advisory Panel. A number of fisheries habitat related issues such as offshore disposal of dredged material, beach nourishment, various impacts to offshore live bottom habitat, and impacts to estuarine wetlands and water quality were addressed. The primary issue addressed this year was considerable effort toward the identification and protection of Essential Fish Habitat (EFH) as mandated in the revised Magnuson-Stevens Fishery Conservation and Management Act. This federal regulatory initiative promises to significantly enhance the protection of important marine fish habitats.

Continuation of activities related to a NOAA funded special area management plan (SAMP) for the Charleston Harbor estuary, begun in 1991 by the Office of Ocean and Coastal Resource Management of SCDHEC (formerly SCCC) have resulted in focusing several important issues related to long-term integrity of the health of our coastal environment. This important project will continue its work into next year to ensure completion of several projects that are key to setting of important policy issues related to coastal environmental integrity. EES personnel have continued to participate on a number of "topic-specific" Task Forces, the stated purpose of which is to provide direction for and assist in guiding the activities of the CHP.

SHELLFISH MANAGEMENT SECTION

The Shellfish Management Section (SMS) develops, implements, and supervises initiatives necessary for the effective management of the State's shellfish resources.

Shellfish Season - The season for harvesting oysters and clams, as authorized in the S.C. Code of Laws, Section 50-17-365, opens annually on September 16th and closes on May 14th unless biological or other conditions warrant other times to open or close. This year the season for harvesting oysters and clams opened on September 16, 1996. Oyster season closed on May 14, 1997; however, due to water temperatures and market conditions the clam season was extended to May 31, 1997.

Shellfish Field Management - In response to legislative changes that were implemented in 1986, shellfish acreage available for public use has nearly doubled. Currently there are 56 State shellfish grounds totaling approximately 4,597 acres of approved bottoms, of which 218 acres are intertidal. Annual assessments of State grounds are conducted during the closed shellfish season (May through September) to determine which grounds, based on assessment of the resource, are suitable for commercial and recreational harvesting during the forthcoming season.

Shellfish Culture Permits - Ninety-seven commercial shellfish culture permits, totaling about 1,718 acres are currently under cultivation. A total of 50,681 bushels of oysters and 2,819,500 clams were harvested during this season from culture permits. Shellfish survey maps, maintained by the Shellfish Management Section (1:12,000 scale), are provided to shellfish culture permit holders and permit applicants. In addition, these maps are made available upon request to the South Carolina Department of Health and Environmental Control, the U.S. Army Corps of Engineers, as well as private entities.

A series of shellfish maps have been developed from National Oceanographic Survey (1:80,000

scale) charts indicating locations and boundaries of the five management classifications of South Carolina shellfish bottoms: 1) Shellfish culture permit grounds, 2) State shellfish grounds, 3) Public shellfish grounds, 4) Water quality classifications, and 5) Grant areas. Boundary information is updated as changes occur.

Shellfish Culture Permit Planting and Assessment - All shellfish culture permit holders are legally required to plant 125 U.S. bushels of seed oysters, shell, or other approved cultch material for each acre under cultivation each calendar year. During this reporting period, one technician and two biologists monitored planting activities. Effective scheduling and communication has resulted in verification of all seed and cultch material planted in 1996. Recorded planting on commercial shellfish culture permits in 1996 was 31,002 U.S. bushels of seed oysters, 9,796 bushels of shell, 6,847 bushels of approved cultch material, 97,010 bushels of in situ cultivation, 5,963 bushels of green-shell and 5,116 bushels of seed clams for a total of 155,734 bushels.

From January 1 through June 30, 1997, 8,201 bushels of seed; 35,263 bushels of in situ cultivation; 3,389 bushels of shell; 337 bushels of clams and 410 bushels of green-shell for a six month total of 47,600 bushels have been verified as planted on culture permits. All Shellfish culture permits not planted with the assessed quota must, by law, be canceled or reduced in acreage by the Department. This requirement mandates that many hours be expended each year in on-site monitoring and proper verification.

Mariculture Permitting and Management - Harvesting is allowed on Shellfish mariculture permits throughout the year. During FY 1996-1997, the Shellfish Management Section processed two applications and four amendments for clam mariculture permits. Nineteen clam mariculture permits totaling approximately 926.1 acres are currently under cultivation, including Atlantic Farms, Inc./SeaPerfect (formally Atlantic Littleneck ClamFarms) in Charleston and Beaufort counties, one of the largest clam farming facilities in the world. One oyster mariculture permit of 15.8 acres was voluntarily relinquished by the permittee.

Commercial Whelk Fishery - South Carolina's offshore whelk fishery began in 1978 as several commercial shrimp fisherman diversified in an effort to compensate for poor shrimp harvests. Using gear similar to shrimp fishing, harvesting subtidal knobbed and channeled whelks evolved as an alternative fishery. Production peaked in 1982 at over 32,000 bushels. Eighty-six permits were issued to trawlers for the January 16 - March 31, 1997 whelk trawling season. Total production reported by dealers was 19,028 U.S. bushels with an ex-vessel value of approximately \$225,672.

Recreational Maps to the DNR'S Home Page - In order to provide wider dissemination of recreational harvesting maps throughout the State, 56 maps of State shellfish grounds and 19 Public shellfish grounds have been digitally scanned and posted on the DNR's homepage (<http://www.dnr.state.sc.us/etc/info.html>). Recreational license requirements, shellfish seasons, catch limits and gear restrictions are included along with maps that may be viewed on-line or downloaded.

Recreational Shellfish Management - Recreational shellfish management activities involve the designation, marking and maintenance of Public shellfish grounds. Demarcation of certain State shellfish grounds designated for recreational harvest has been accomplished. A law passed in 1996 (Section 50-17-370), redesignated Public oyster grounds as Public shellfish grounds. The new law enables the Department to modify boundaries and delete or establish grounds as considered necessary. Additionally, it prohibits the construction of docks or other structures within Public shellfish grounds and restricts the location of new Public shellfish grounds to areas that are a minimum of one-thousand feet from high ground, the current maximum allowable length of a dock.

Recreational shellfish areas continue to be established in accordance with the new law. Eighty-one boundary and "Cull-in-Place" signs have been deployed on 19 grounds. Locations

of all newly installed signs have been documented with a Global Positioning System (GPS) unit. This information is entered into the Division's Geographic Information System for inventory purposes.

Relay of seed oysters from over-grown areas to Public shellfish grounds, utilizing the R/V Oyster Catcher II, has continued. During the twelve month reporting period, a total of 14,659 U.S. bushels of oysters were planted on recreational areas. Plantings were conducted in Beaufort, Charleston and Georgetown Counties.

Implementation of Molluscan Shellfish Importation Policy - During 1997, three mariculture operations imported seed clams into South Carolina from Maine and New Jersey for "overwintering" or grow-out and return to New England areas. In accordance with Section 50-17-357, S.C. Code of Laws, each year class of clams was histologically examined and determined to be free of pathogens prior to shipment. In addition, clam shipments were examined at Fort Johnson en route to impoundments to insure they were free of other organisms.

MARINE RESOURCES RESEARCH INSTITUTE

Marine Resources Research Institute (MRRI) provides the scientific expertise and capabilities to support the MRD's resource management and educational programs. To accomplish this mission, Institute scientists work closely with the Office of Fisheries Management (OFM) to identify issues affecting the state's estuarine and marine resources, assess the condition of the state's fisheries, and conduct the research to conserve, restore, and enhance the state's marine resources.

MRRI is also responsible for developing technology to support the state's growing mariculture industry. Much of the mariculture research is conducted at the James M. Waddell Mariculture Center (WMC) located in Bluffton, S.C. Finally, Institute scientists participate in cooperative research and education programs with the state's colleges and universities. Most of the Institute's scientists have adjunct appointments with the University of Charleston (UOC), the Medical University of South Carolina (MUSC), Clemson University (CU), South Carolina State University (SCSU), and/or the University of South Carolina (USC). Accomplishments for the Institute's research and educational programs from 1 July 1996 to 30 June 1997 are described below.

FISHERIES RESEARCH PROGRAMS

Program Background - Since its inception, the MRRI has conducted monitoring and assessment programs that evaluate the condition of the state's economically important fisheries including: (1) development and evaluation of technology for determining the status and trends; (2) conducting research to determine environmental factors influencing the abundance and distribution of numerically abundant coastal fishes; and (3) working with OFM to identify and evaluate management alternatives for conservation and prudent utilization of coastal fishery stocks. These programs are funded primarily with grants and contracts from the National Marine Fisheries Service (NMFS), national and state Sea Grant programs, and revenues raised from fishing taxes and licenses.

Coastal Finfish and Crustacean Surveys - In FY 1996-1997, MRRI staff continued to monitor the status and trends of fish populations inhabiting offshore reefs and hard bottom habitats as part of the NMFS-MRD Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP). During FY 1996-1997, 444 chevron fish trap, 44 longline, and 18 hook and line samples were taken by staff to estimate relative abundance and obtain life-history data for evaluating the status of numerically abundant reef fish. Chevron traps and hook and line gear were also used to capture, tag, and release 4,200 reef fish including gag, greater amberjack, vermilion snapper, red porgy, white grunt, gray triggerfish, wreckfish, and scamp. Data from tag returns were used to evaluate movement patterns and growth. Technical reports were produced

on the status of reef fish stocks, tagging activities, and the life history of gag, blackbelly rosefish, and white grunt.

The FY 1996-1997 MARMAP data suggest the harvest of blackbelly rosefish and white grunt have increased in recent years. Both of these species are long-lived fish (36 and 27 years respectively) that have life history characteristics (e.g., slow to mature) which suggest that these populations are at risk of being overfished. Overfishing of blackbelly rosefish and white grunt stocks may be a concern in the future.

Decreasing trends in relative abundance and catch statistics for red porgy, vermilion snapper, and black sea bass indicate that these species are probably overfished. Life-history studies further corroborated the overfished status of vermilion snapper populations and indicated that red porgy populations are probably in a state of collapse. Decreases in the abundance of vermilion snapper, red porgy, and black sea bass were accompanied by increases in the abundance of less desirable species including tomtate and gray triggerfish.

Gag grouper is another important reef fish for which populations are declining due to overfishing. Life history data suggest that female gag become sexually mature at smaller sizes today than during the 1980s. In addition, gag populations contain fewer males now than they did 15 years ago. The recruitment of gag to estuarine nursery areas was also much lower from 1995-1997 than during the 1980's. Tagging and genetic studies indicate that there is one stock of gag along the southeast coast of the United States with movement of a portion of the spawning population from SC to the coast of Florida during the spawning season. The above findings suggest that overfishing has adversely altered gag reproduction and recruitment processes to a point where immediate management action may be required.

Greater amberjack populations were found to be very mobile during FY 1996-1997. A number of the amberjack that were tagged off of SC were captured by commercial fishermen in eastern and western FL and Cuba. Most other dominant reef fish (e.g., vermilion snapper, red porgy, black sea bass) that were tagged by MRRI staff were generally recaptured in the same area that they were tagged.

The MRRI continued to monitor the status and trends of living resources in shallow coastal waters through the NMFS-MRD Southeast Area Monitoring and Assessment Program - South Atlantic (SEAMAP-SA) in FY 1996-1997. This program monitors the abundance, biomass, and composition of bottom and pelagic fishes and crustaceans (shrimps and crabs) from Cape Hatteras, NC to Cape Canaveral, FL. The data which were collected in FY 1996-1997 have already been made available to fishery managers and scientists throughout the region through reports and by incorporation into the NMFS SEAMAP database which can be accessed by a broad range of users. In addition, SEAMAP provided samples of blood, tissue, and whole specimens to many state and federal projects. A joint SEAMAP/MARFIN Project to collect data for the development of age-length keys for whiting, spot, Atlantic croaker, and several other coastal species concluded in FY 1996-1997. These data are currently being analyzed and will be presented in a 1998 report.

Finfish and Crustacean Genetic Studies - The MRRI Fishery Genetics Laboratory conducted studies on red drum, weakfish, spotted seatrout, wreckfish, groupers, black sea bass, and white grunt using DNA technology in FY 1996-1997. The goal of this research was to define populations of these important fish species that represent fishery management stocks. Research also was initiated on shrimp genetics. These studies found that: (1) a single population of red drum is found from SC to Indian River, FL; (2) weakfish do not appear to have separate populations along the Atlantic Coast; (3) spotted seatrout along the Atlantic coast comprise a single stock that is different from Gulf of Mexico stocks; (4) black sea bass are separated into Gulf of Mexico and Atlantic stocks; (5) populations of black sea bass north and south of Cape Hatteras may be genetically different; (6) the genetic differences between white grunt from SC and Belize/South

FL were sufficiently large to suggest white grunt from these areas may represent different species; and (7) white shrimp populations within the southeastern region had no geographic patterns in genetic variation.

Other research activities conducted by Fisheries Genetics Laboratory included: (1) research on genetic control of reproductive physiology in white perch; and (2) a study to determine if the white spot virus occurred in shrimp or other crustaceans in SC. The white perch reproductive studies were conducted in conjunction with Dr. Craig Sullivan of North Carolina State University (NCSU) and identified receptors for vitellogenin, which is the major energy source for developing eggs. This research identified two genes that encode these receptors, one of which was previously unknown to science. Knowledge of the functioning of these receptors has potential applications for environmental quality monitoring, aquaculture, and genetic engineering for many species of fish. The white spot virus study concluded that white spot, or a closely related virus, occurred in a wide variety of SC crustaceans including grass shrimp, blue crabs, fiddler crabs, and stone crabs. The source and consequences of this virus to wild shrimp populations is being evaluated by staff.

Estuarine Finfish Monitoring and Research - The objectives of MRRI's inshore fisheries research program are to: (1) determine the status and trends for numerically dominant estuarine gamefish; (2) conduct analyses required to effectively manage important recreational fisheries; and (3) disseminate research monitoring findings to resource managers, other scientists, and the general public. During FY 1996-1997, a continuing effort was made to define abundance trends for red drum, spotted seatrout, southern flounder, sheepshead, and black drum from the Santee River to the ACE Basin. As a part of this research, age-length keys for abundant species were refined to reflect current population structures. MRRI staff also continued to develop the use of standardized trammel net surveys and tagging studies as standard methods for collecting the natural history data required for population analyses of southeastern estuaries fish stocks. MRRI staff also conducted hydro-acoustical surveys during the black drum and red drum spawning seasons to identify reproductive aggregations and define spawning sites. Additional spawning sites for both species were found in the Beaufort area, and environmental information about these sites were incorporated into SCDNR data bases.

A concerted effort was initiated in FY 1996-1997 to use the Institute's extensive red drum tagging data to validate the mortality estimates used for red drum population assessments and modeling. This work is being funded by the US Fish and Wildlife Service (USFWS) and NMFS. A four state cooperative study (GA, SC, NC, FL) also was funded this year by the NMFS MARFIN program to collect population data for red drum (ages 1-3) throughout the region using standard methods. Finally, the SC Marine Recreational Fisheries Stamp Program provided funding to publish a guidebook for spotted seatrout.

Shrimp and Blue Crab Research - Early life stages of white shrimp and blue crabs move from offshore spawning areas to estuarine nursery habitats through coastal inlets. In FY 1996-1997, MRRI continued a Sea Grant funded study with the Skidaway Institute of Oceanography (SKIO) to identify and evaluate the factors that influence larval shrimp and crab transport processes. For this study, MRRI and Skidaway staff collected plankton, hydrographic and acoustic data from the Ogeechee estuary. This estuary was selected for study because of its high freshwater inflows. From 1993-1996, Institute staff conducted similar research, also with SKIO, for the North Edisto Inlet which is characterized by low freshwater inflows. During FY 1996-1997, a final report of the research conducted for the North Edisto Inlet was provided to Sea Grant, and several scientific papers were published. Analyses and integration of the Ogeechee and Edisto data sets, which will occur in the future, should assist in defining similarities and differences in transport mechanisms and processes between high and low runoff estuaries. Ultimately, this information should provide insight into the degree to which year-to-year differences

in transport affects year class strength for shrimp and crab populations.

Oyster Reef Habitat Studies - During FY 1996-1997, the Shellfish Research Section continued its long-term Oyster Habitat Research Program (OHP) examining the function and development of intertidal oyster reef habitats. To date, staff have developed "new" protocols to quantitatively sample intertidal oyster reefs and generated a data set on the effects of the physical environment on oyster recruitment, growth, disease status, and reef development. Staff also have identified more than 60 species of fishes and mobile crustaceans that migrate onto and off the oyster reef habitat with changes in tidal stage, and over 70 species of resident reef biota. Grass shrimp, the predominant prey of juvenile sportsfish, were extremely abundant on oyster reefs. Penaeid shrimp were also abundant inhabitants of reefs. These data demonstrate that oyster reefs support large numbers of recreationally and ecologically important species. This finding suggests that oysters have value beyond their value as a seafood delicacy.

A three-year data set on oyster recruitment and environmental factors influencing recruitment was also compiled in FY 1996-1997. In addition, studies to define factors (e.g., age, location, habitat) associated with the onset of oyster diseases and survival of subtidal and intertidal oysters were initiated. Oyster diseases and associated population life history traits (e.g., growth, survival) were found to be very different between subtidal and intertidal environments. In the coming year, staff will sample and define relative habitat value of additional creek habitats for oyster communities.

Bivalve Disease Monitoring - In FY 1996-1997, a state-wide assessment of the oyster diseases, MSX (*Haplosporidium nelsoni*) and Dermo (*Perkinsus marinus*), was initiated using funding from Marine Recreational Fisheries Stamp Program. For this study, more than 1,300 oysters from 52 sites representing all regions of the state were evaluated. Dermo was present at all sites, with the mean percentage of infected individuals ranging from 20% (Lucy Point Creek, Beaufort County) to 100% (Swinton Creek, Cut Off Reach, Clark Sound, Sewee Bay, and Fripp Inlet). Dermo infection levels ranged from very low (Lucy Point Creek) to moderate (Clambank Creek, Sewee Creek and Cut Off Reach). Highest Dermo infection levels occurred in the summer and fall and lowest in the winter and spring. MSX was present at 54% of the sites. The most severe MSX infections were found at Mathews Cut in Charleston County.

Hatchery-reared specific-pathogen-free (SPF) oysters were deployed at six locations representing all regions of the state to evaluate relationships between growth, survival, and disease status. Survival and growth varied among the locations but there were no significant correlations between growth or survival and disease status. Some of the sites that had the poorest survival and growth had relatively low levels of Dermo, while sites which had the best growth and higher survival had the highest Dermo prevalence and intensity levels. MSX samples for this study are still being processed.

Oyster recruitment was measured at 23 sites in FY 1996-1997. Recruitment levels were generally lower than those historically reported. These differences may be an artifact resulting from differences in sampling methods. Recruitment varied considerably among sites, with no discernible geographical pattern. Settlement was not related to the incidence and/or prevalence of MSX and Dermo in adjacent oyster populations.

ENVIRONMENTAL RESEARCH PROGRAM

Program Background - MRRI's Environmental Research Section conducts studies to evaluate the consequences of human-related activities on marine and estuarine resources. Much of this research is directed to development of technology and conduct of surveys for assessing the condition and quality of the habitats (e.g., tidal creeks, estuaries) that are critical for sustaining fishery resources. Research emphasis during FY 1996-1997 included: (1) quantifying the effects of pollution exposure on living marine resources in tidal creeks and deeper estuarine habitats; and (2) evaluating the impact of non-polluting anthropogenic activities on critical habitats and

communities. Information produced by the Institute's Environmental Research Section is used by OFM and other governmental agencies to comment on permits and proposed development.

Estuarine Pollution and Monitoring Studies - During FY 1996-1997, MRRI staff continued two studies designed to quantify levels of estuarine habitat degradation resulting from pollution exposure and land development. The first study, the Environmental Monitoring and Assessment Program (EMAP), was initiated in 1994 to assess the environmental quality of estuarine resources for the southeast. During FY 1996-1997, MRRI staff completed the sample processing for the 1995 field effort, assisted NOAA in summarizing the data collected through 1996, and completed 40 seed-clam bioassays as part of the 1996 field program. MRRI staff also developed a Benthic Index of Biological Integrity (IBI) for southeast estuaries with NOAA. This index was further refined to create an IBI for SC and GA estuaries which has been shown to be about 80% effective in classifying sites as degraded or undegraded. The 1995 EMAP survey found that 51% of southeast estuaries had either degraded bottom communities, elevated contaminants, or excessive sediment toxicity; however, only 7% of the region was degraded in all three pollution exposure characteristics. Although insufficient sampling was conducted in SC to reliably estimate the area of SC estuaries that was degraded, the EMAP study has identified methods that are useful for evaluating the environmental quality of SC estuaries.

The second study, the Tidal Creek Project, was initiated in 1994 using funding from Charleston Harbor Project and the Marine Recreational Fisheries Stamp Program. The goal of this study was to link the degree and type of watershed development and ecological conditions in the many shallow tidal creeks that drain SC coastal watersheds. All sampling and data analyses for this study were completed in FY 1996-1997, and a technical synthesis of the information is being prepared. The major findings of the Tidal Creek Project will be summarized in the *S.C. Wildlife Magazine* in 1998. Major findings of the Tidal Creek Project were: (1) tidal creek channels are repositories for chemicals released from coastal watersheds and creeks draining urban and industrial watersheds, frequently contained biologically harmful levels of toxic chemicals; (2) shallow tidal creeks are also conduits for delivery of pollutants from coastal watersheds to deeper estuarine habitats; and (3) the amount of impervious surface in a watershed is a good indicator of the extent to human development and the degree of tidal creek degradation.

MRRI also initiated a study of environmental and biological conditions of the Broad Creek and Okatee River estuaries in Beaufort County in FY 1996-1997. This study is being funded by the Beaufort County Council and the SC Department of Health and Environmental Control. Its goal is to compare conditions in the heavily developed Broad Creek with those in the relatively pristine Okatee River. Data obtained from this study will help the county and town councils in developing land use management plans and will provide baseline information for assessing the impacts of future development. More importantly, the study provides an opportunity for MRRI staff to evaluate relationships between ecological conditions in tidal creeks and deeper estuarine habitats. Staff are also using this study to evaluate how the MRD/MRRI should conduct similar monitoring activities throughout SC to periodically assess the condition of coastal habitats.

When dredged material is contained within diked areas on upland environments, it frequently creates productive wetland habitats. These created wetlands may be used as feeding and nesting habitats by waterfowl. However, most diked disposal areas are adjacent to ports and frequently receive contaminated sediments. Contaminants may accumulate in prey of waterfowl ultimately being transferred to and adversely affecting waterfowl populations. In FY 1996-1997, MRRI conducted a study of the Savannah River Diked Disposal Areas with the USFWS and NMFS to evaluate chemical and biological conditions and identify threats to waterfowl. MRRI's responsibility was to describe the bottom dwelling communities that inhabited the disposal sites, particularly the shallow submerged habitats that are utilized by Black-necked stilts. A report of our findings was submitted to the USFWS in April 1997. Major findings were: (1) because of reduced tidal

flushing disposal areas contain higher abundances of insects than adjacent estuarine wetlands; and (2) the relative abundance of prey for waterfowl in diked dredged material disposal areas were similar to that of adjacent natural wetlands suggesting disposal areas would be used as feeding habitat by birds.

Coastal Pollution and Monitoring Studies - Pollution in SC's offshore coastal environment is generally not considered to be an issue. However, concerns have been raised about the levels of contaminants associated with offshore dredged material disposal operations and the effects these contaminants may have on coastal biota. In FY 1996-1997, staff completed an assessment of conditions for the Charleston Ocean Dredged Material Disposal Site (ODMDS). This study was funded by the U.S. Army Corps of Engineers (ACOE) and documented that the levels of chemical contaminants at the ODMDS did not represent an ecological concern. Results of this study established baseline conditions for the ODMDS for assessing impacts that may result from the Charleston Harbor Deepening Project. The Deepening Project which will begin in 1998 will involve the disposal of large quantities of dredged material into the ODMDS. A report describing the two-year baseline study was prepared and submitted to the ACOE.

Concerns have also been raised by regulatory agencies about the possible transfer of contaminants from decommissioned naval vessels that were sunk to create artificial reefs to fish and fishermen. To address these concerns, MRRI conducted a study with OFM to measure the levels of contaminants in encrusting biota and fish from selected vessels that were sunk off SC. No elevated levels of contaminants were found suggesting that artificial reefs created with sunken vessels off SC do not represent a threat to finfish populations or fishermen.

Toxicology and Chemical Monitoring Studies - In FY 1996-1997, MRRI continued to evaluate methods for measuring pollution exposure and effects through a number of independent but related studies. The Bivalve Biomarker Project, which was initiated in 1995, using funding from NOAA, is a collaborative effort between MRRI, NMFS, and USC. For this study, hatchery-reared and wild oysters were deployed at contaminated and uncontaminated sites in SC to determine if cellular-level responses of oysters provided early warning of pollution exposure and chronic effects. Oyster tissues were evaluated for a variety of cellular-level responses as well as contaminant bioaccumulation. Sediment samples from deployment sites were also evaluated to document the degree and type of pollution exposure. The findings of this research suggest that cellular assays are potential indicators of chronic anthropogenic stress.

MRRI also conducted a collaborative study with NMFS and USC to compare the sensitivity of bioassays that are frequently used by regulatory agencies to evaluate the ecological threat of pollutants. The assays evaluated used an array of test organisms, including amphipods, copepods, grass shrimp, juvenile hard clams, a rotifer, and a microbial organism. Test organisms were exposed to contaminants representative of the major categories of pollutants released into coastal environments including cadmium, DDT, and flouranthene. The results of this research, suggested that no single assay is the most sensitive for all contaminants. Multiple assays are required to predict and evaluate the ecological risk of a mixture of pollutants.

The concentration of chemicals in aquatic environments is variable and frequently below the detection level of all but the most sensitive and expensive measurement methods. To estimate pollution exposure and assess the threat of chemicals for aquatic environments, one therefore has to either make large numbers of expensive measurements or develop methods that concentrate chemicals in a manner that represents cumulative pollution exposure. Some studies have used body burdens of indigenous biota that bioconcentrate contaminants (e.g., oysters) to represent cumulative exposure. However, most marine biota only inhabit a portion of the salinity zones or geographical regions of concern. To address this problem, MRRI continued research during FY 1996-1997 evaluating the effectiveness of semipermeable membrane devices (SPMDs) in estimating contaminant exposure and functioning as model organisms for a range of

environmental settings. For this research, the effectiveness of SPMDs were tested in static controlled laboratory conditions for single contaminants and demonstrated to be a reasonable technology for estimating relative exposure. In addition, SPMDs were deployed in the natural estuarine environment at two locations: (1) in Beaufort near a known source of PCBs; and (2) in Jenkins Creek in Charleston Harbor where a recent oyster die-off had occurred. The SPMDs concentrated PCBs at the Beaufort site and the pesticide, diazion, in Jenkins Creek. The diazion may have contributed to the oyster decline in this creek. Further evaluation of the SPMDs will be conducted during the next fiscal year.

Beach Nourishment Studies - Beach erosion is a major problem for large portions of the SC coastline, and numerous beach nourishment projects have been initiated to restore the recreational value of beaches and protect beach front property from storms. MRRI continued research during FY 1996-1997 to evaluate the effects of nourishment projects on marine resources. Most of this research was conducted jointly with Coastal Carolina University and was part of the Grand Strand Renourishment Project. This project encompasses 24 miles of coastline, making it one of the largest beach nourishment projects ever undertaken. Project goals were to assess biological and physical impacts of nourishment activities on the beach and in borrow areas from which the sand was obtained. Preliminary analysis suggests nourished beaches recover rapidly and have a similar numbers and types of biota as reference areas. The post-nourishment fauna was also similar to that which occurred on the beach before the sand was deposited.

MRRI also worked with Coastal Carolina University and the ACOE to evaluate six historically used borrow sites. Bathymetric data indicated that most borrow sites refilled at slow rates (> 5 years). A report describing the results of this study is being prepared. MRRI will continue to evaluate the extent and magnitude of this problem at the four large borrow areas used for the Grand Strand Beach Renourishment Project.

Finally, MRRI evaluated the biological effects of beach scraping during FY 1996-1997. This alternative to beach nourishment involves the use of earth-moving equipment to scrape sand from depositional intertidal sites and place it in erosional areas to restore elevation and protect beach front property. The Town of Kiawah Island conducted a beach scraping project in 1996 to restore an 8,000 foot escarpment. Approximately 60 days after scraping, MRRI surveyed the bottom-dwelling animal community on the scraped beach at nearby reference sites. Scraped and reference sites were similar with respect to abundance, diversity, and composition of the dominant species indicating recovery had occurred. This finding was consistent with the findings of other beach scraping studies in South Carolina.

Hydraulic Harvester Study - Harvesting of hard clams using hydraulic escalator devices represents a form of habitat modification that recreational fishermen have suggested may adversely impact estuarine habitats. To evaluate this issue, MRRI conducted a study in FY 1996-1997, funded by the ACOE, to assess the effects of clam harvesting on: (1) turbidity; (2) the abundance, diversity, and species composition of bottom-dwelling biota; and (3) the abundance, diversity, and species composition of fish, crabs, and shrimp. Findings of this research suggest that turbidity increased in the creeks during harvesting; however, these increases were ephemeral and localized. No evidence of adverse impacts on fish or invertebrate communities were found. A final report describing these studies is being prepared.

ACE BASIN RESEARCH RESERVE PROGRAM

During FY 1996-1997, MRRI continued biological and environmental quality monitoring to define baseline conditions in the ACE Basin National Estuarine Research Reserve (NERR). Preliminary analyses of a three-year sediment contaminant study found that the contaminant input to the ACE system was low. Trace metals and organic contaminants did not exceed levels that are reported to effect living resources. MRRI staff also analyzed long-term dissolved oxygen data from the ACE and several other reserves (Chesapeake Bay, VA; North Carolina; North Inlet/

Winyah Bay; and Weeks Bay, AL). Major findings of these analyses were: (1) dissolved oxygen levels in ranges reported to be stressful to living resources occurred in all reserves; (2) dissolved oxygen levels in SC were more dynamic and frequently more stressful than those in other geographical regions; and (3) comparison of existing dissolved oxygen data among reserves was problematic because standard methods had not been used for collecting these data. Recommendations for how dissolved oxygen measurements should be made in reserves are being developed.

The second year of a horseshoe crab population study was completed in FY 1996-1997 including a tagging study to evaluate migration patterns. During the 160 surveys at five sites, nearly 1500 horseshoe crabs were tagged and measured. Peak spawning activity occurred in May. Highest spawning activity occurred during nighttime flood tides and on a waning moon. Over 100 tag returns were reported. One of the tagged crabs was recaptured near St. Catherine's Island, GA, suggesting this species has the capability to move long distances.

Two nutrient cycling studies were initiated in the ACE Basin during FY 1996-1997. The objective of one study is to compare water quality conditions at a relatively pristine area to conditions at a site highly impacted by non-point source pollution. Christopher T. Nietch, a NOAA/NERRS Graduate Fellow, also began his Ph.D. research project, entitled "The Relationship between Carbon and Nutrient Dynamics in Tidal Marsh Sediments and Surface Water Quality in Non-impacted and Impacted Regions of South Carolina Estuaries". The objective of this study is to evaluate the relationship between surface water quality, and carbon and nutrient cycling in tidal marshes. The data which are collected by these nutrient studies will be discussed in future annual reports.

Considerable progress was made in FY 1996-1997 toward completion of a site profile for the ACE Basin NERR and surrounding watersheds using funding from NOAA. Initial efforts of this multi-organization project were to define the information needs of resource managers through surveys and by conducting a user's workshop. The South Carolina Parks, Recreation, and Tourism Department will be responsible for compiling the information on tourism, and the Corporation for Economic Development will be responsible for assembling the socio-economic information. The Land and Water Resources and Wildlife and Freshwater Fisheries divisions are compiling information on living and non-living natural resources. MRD is assembling the data layers which include information on soils and geology, land use and land cover, water uses and water quality, significant natural and cultural sites, and socio-economic information into a data base. MRRI staff are also compiling information for marine resources. Staff will use the comprehensive data base to conduct an inventory of ecological habitats and resources and complete the site profile for the NERR.

Information produced by the many research efforts being conducted in the ACE Basin was integrated into the reserve's education program that included boat trips, trail walks, teacher workshops, and outreach activities. In addition, staff sponsored a seminar series for the general public that was held in the Charleston and Beaufort areas.

MARICULTURE PROGRAMS

Program Background - As world fisheries continue to be over-harvested, the availability of seafood products will become limited. In response to declining natural seafood supplies, MRRI has for over 20 years conducted research to develop mariculture technology as a means to reduce harvest pressure on wild stocks and supplement wild fisheries. Current MRRI mariculture research programs include: (1) development and refinement of culture technologies for valued marine and estuarine species; (2) evaluation of stocking hatchery-reared fish as a tool for restoring and improving wild fisheries; (3) refinement of commercial mariculture methods; (4) development of technologies that reduce the environmental impacts of aquaculture operations on adjacent ecosystems; and (5) conduct of extension services to transfer research findings to the private

sector. In addition, MRRI's mariculture programs routinely provide animals, expertise, and holding facilities to other state and federal programs.

Development and Refinement of Culture Technology - Research conducted by MRRI staff in FY 1996-1997 to develop technology for cultivation of additional fish species was directed toward southern flounder and southern king whiting. The southern flounder research, which is being supported by Sea Grant, initiated spawning by holding brood stock in indoor tanks at a constant photoperiod and temperature throughout the winter. Final maturation and ovulation were induced using slow-release hormone implants. More than 11 million eggs were collected from 3 females over a 39 day period, suggesting this technique is more effective than the manual spawning techniques used by most other researchers. Flounder larvae were stocked in ponds, and 5,587 fingerlings were produced. Larval survival was about 3.8%. This survival level is lower than that routinely achieved for red drum and striped bass larvae; however, refinement of nursery techniques should result in increased survival. Laboratory studies indicated that 50-day old flounder tolerated salinities as low as 5 ppt and that a 220-day old flounder could survive and grow in fresh water. Studies will be conducted in the future to evaluate flounder growth and survival in freshwater. If satisfactory growth and survival can be demonstrated, it may be possible to rear flounders in both inland and coastal environments.

Research on whiting were conducted using state funds. The whiting is a desirable culture candidate because of its delicate flavor and scarcity in the market place. Adult whiting were captured from the wild and conditioned to spawn at WMC in maturation tanks. Staff are preparing to spawn the fish, which has not be done previously in captivity. Offspring that are produced will be stocked in ponds and used to develop fingerling production methods.

Stocking Experiments - The USFWS supported MRRI to evaluate the effects of stocking fingerling red drum in the Colleton River on indigenous red drum populations. The goal of this project is to develop the technology (hatchery and stocking protocols) for restoring and/or enhancing red drum populations. Hatchery-reared fish are chemically marked prior to release to facilitate determination of their source when they are recaptured. During FY 1996-1997, over 1.2 million fingerlings were released into the Colleton River. At present, 49% of the 1-2 year-old red drum (10-20 inch long) in the river are stocked fish. By stocking fish during the fall and spring it was possible to evaluate if time of release influenced recruitment into indigenous populations. No difference was found in the relative contribution of red drum stocked in the spring or fall. Movement and growth of the stocked fish will be monitored for the next 2 years.

Angler Reporting - MRRI is conducting a project to estimate the effect of reward level on angler reporting of tagged red drum in SC and GA using a NMFS grant. Angler reporting level is an important component in the models used to assess stock condition and establish population controls (e.g., harvest level). If substantial non-reporting occurs, harvest would be underestimated resulting in establishment of controls that may lead to overfishing. For this study, several thousand legal size tagged red drum were stocked in four SC and GA estuaries. Rewards were either the standard reward provided by state tagging programs (a hat or T-shirt) or \$100. Approximately equal numbers of fish were stocked for each reward type. The data suggest a significant level of non-reporting occurs in both states. This study will continue into next year and results will be refined to recommend the appropriate correction factor that fishery modellers should apply in their analyses.

Refinement of Commercial Techniques - A number of species (3 shrimp, 2-3 fish, 2 bivalves) are commercially cultured in the SC coastal zone and improvements in culture methods for these crops will increase production levels and profitability. In FY 1996-1997, using funding from Sea Grant, MRRI continued to evaluate the potential of backcross hybrid striped bass as an alternative to white bass/striped bass crosses, called sunshine bass, which are the standard for the hybrid striped bass farming industry. Results found that pond reared backcross hybrid females

produced viable eggs and larvae. In contrast, pond-reared striped bass females do not produce viable offspring. Several experiments also examined the salinity tolerance of various life stages of backcross hybrids. These results indicated that backcross hybrid larvae do not tolerate salinities greater than about 15 ppt. Fingerlings (40 day old), however, grow and survive over a wide range (0-30 ppt) of salinities. These findings demonstrate that backcross hybrids can be grown in a range of environmental settings. Diet studies found that backcross juveniles grow as well when fed cheaper 38% protein feed formulations as they did when fed the expensive 52% high protein diets. This finding indicates feed cost to raise backcross hybrids are relatively low. Results of these studies, and research conducted in previous years, indicate that the backcross hybrid striped bass is an alternative to first generation striped bass crosses.

Much of the MRRI shrimp aquaculture program in FY 1996-1997 was directed to evaluating biosecurity protocols for disease control using funding from the U.S. Department of Agriculture (USDA) Marine Shrimp Farming Program. The importance of biosecurity was highlighted in the winter of FY 1996-1997 when a mixed population of native and Pacific white shrimp at WMC was diagnosed to have a virus belonging to the White Spot complex. Viruses of this group were previously known only in Asia. The source of the infection at WMC, however, was attributed to native shrimp captured in local waters and brought into WMC holding facilities for overwintering. As a result of this disease outbreak, the infected shrimp and other shrimp stocks at WMC were destroyed and production units sterilized. The facility was then restocked with Pacific white shrimp certified to be free of known pathogens. None of the restocked shrimp, nor their offspring, which were grown to commercial size in ponds during the spring and summer of 1997, were re-infected with the virus. In addition, a prototype biosecure culture system was constructed and evaluated to assess its effectiveness. The prototype biosecure system consisted of covering an existing pond with a greenhouse and disinfecting the water before stocking it with shrimp. Shrimp stocked in the biosecure culture system exhibited production levels similar to standard outdoor ponds filled with untreated water.

MRRI also conducted a wide variety of other shrimp aquaculture research in FY97 including: (1) seed stock production studies that evaluated various genetic lines from the U.S. Marine Shrimp Farming Program disease-free breeding center; (2) research on probiotics for shrimp hatchery applications; (3) bioassays to define transmission pathways for shrimp diseases; and (4) research on microbial communities in shrimp ponds to better understand how ponds process carbon and nitrogen. Results of these experiments were summarized in technical reports to USDA.

The National Coastal Resources Research and Development Institute (NCRI) funded MRRI to continue research on a tidally powered upwelling hard clam culture system. The private grower participating in this project completed the growth trials in FY 1996-1997. These data were provided to MRRI and are being analyzed to develop system production and capacity estimates. OFM will conduct economic evaluations for the new system in 1998. The third component of the project is a policy/regulatory review being conducted by Sea Grant.

Development of Sustainable Mariculture Technology - Sustainability of the mariculture industry along the SC coast is a major concern to MRD/DNR and using funding from Sea Grant, MRRI continued to conduct research in FY 1996-1997 on how to make aquaculture in the SC coastal zone economically and environmentally sustainable. As part of this program, staff made further refinements to an integrated pond-based system which used pond discharge water from 1996 to grow shrimp and secondary crops in 1997. The integrated system included protocols for collecting, concentrating, drying and pulverizing materials that accumulate on pond bottoms and degrade water quality. This material was demonstrated in previous years to be a low cost, high quality soil supplement for vegetable crops. The growth of shrimp in the integrated system was compared to that in control ponds filled with new water. All ponds were managed to have no

water exchange. Findings suggest shrimp growth and survival in the integrated culture system and conventional ponds were similar. Production in all ponds exceeded previous world records for ponds operated without routine water renewal.

The NMFS also funded MRRI to evaluate the impact of intensive hard clam culture operations on estuarine ecosystems. For this research, MRRI will work with the clam farming industry to conduct field experiments that evaluate the effects of currents and food supply on clam growth for a range of stocking densities. This research will also evaluate the importance of food source to clam growth and productivity. Finally, the direct and indirect effects of clam mariculture on indigenous fauna will be examined. When completed, this study will develop recommendations for best management practices for intensive hard clam culture operations.

Shellfish Hatchery Program - Specific pathogen free oyster production by the MRRI shellfish hatchery was very successful this year. Disease free spat were provided to: (1) WMC (~55,000) for use in the environmentally-friendly aquaculture project; (2) MRRI biomarker studies (~1,000); (3) Virginia Commonwealth University researchers studying oyster diseases (~5,000); and (4) USC for a Oyster Disease Research Project (~7,000) being conducted with MRRI. Hatchery produced spat were also set on plates and deployed at MRRI's oyster reef study sites as part of a graduate thesis research.

Extension Activities - Information obtained from the various research projects described above were provided directly to SC aquaculture growers through workshops sponsored by the SC Aquaculture Association and regional and national aquaculture associations (e.g., Striped Bass Growers Association, SC Shrimp Farmers Association; Catfish Farmers of America; and Tilapia Growers Association). In addition, staff assisted a farmer in obtaining a Small Business Innovative Research Grant for commercial application of hybrid striped bass fingerling production techniques developed by MRRI. Staff also submitted a proposal to the NCRI with a local grower to apply sustainable aquaculture protocols developed at WMC and Clemson University on his farm. Finally, MRRI extension specialists made over 100 visits to aquaculture operations to discuss problems and assist in resolving them. These types of interactions and relationships provide the most effective methods we have identified for transferring technology from researchers to businessmen.

EDUCATIONAL PROGRAMS AND ACTIVITIES

Program Background - MRRI staff continued to support marine science education programs at the state's colleges and universities in FY 1996-1997. The MRRI also provided seaside facilities for student and faculty research programs and in cooperation with the UOC and NMFS maintained a marine and environmental science library for use by staff, students, and the public.

Graduate, Undergraduate, High School and Public Education - During FY 1996-1997, Institute staff continued to function as advisors and committee members for students from the University of Charleston's (UOC) Marine Biology Program, the Medical University of South Carolina's (MUSC) Marine Biomedical and Environmental Sciences Programs, the University of South Carolina's (USC) Marine Science Program, Clemson University (CU), and several other regional academic institutions. MRRI scientists guided the graduate research of 31 students, and staff contributed to graduate classes at UOC, USC, and MUSC. Other educational and training projects supported by MRRI staff included: mentoring undergraduate and high school students in internship programs, providing technical support for teacher workshops and in-service training, conducting technical seminars and civic presentations, and participating in MRD/SCDNR promotions including the Sportsman's Classic and the Southeastern Wildlife Exposition. MRRI staff made over 62 presentations to the general public and technical audiences reaching an estimated 7,255 individuals. A report summarizing the historic role of the MRD/MRRI in marine science education was completed.

To commemorate the 25th anniversary of MRD, a shipboard broadcast from the Research

Vessel Palmetto by the SC ETV Project Discovery was sent to classrooms across the state. This program conveyed a fishery conservation message to students in grades K-12. MRRI staff contributed to the development of the script and participating in the live interviews by answering student questions submitted over the telephone. A condensed version of the broadcast will be made available to a national ETV audience.

Minority Training and Recruitment - During FY 1996-1997, MRRI continued to administer and provide technical support for MRD's Minority Internship and Training Program. The program is cooperatively funded by MRD and the National Science Foundation and included scientist mentors from Marine Research Institute and UOC. The goal of this program is to provide minority undergraduate students a positive learning experience in marine and environmental science, thereby increasing the number of qualified minority candidates that apply for jobs with the SCDNR. For this program, six minority students participated in a 12-week-long program that involved completion of mentor-guided research projects. The students also had the opportunity to discuss careers in marine science with four visiting minority scientists who presented seminars.

MARINE RESOURCES LIBRARY

The Marine Resources Library (MRL) merged its holdings and operations with similar activities at the NMFS/Charleston Laboratory in FY 1996-1997 using a federal grant. As a result of the merger, each agency was able to cancel subscriptions for approximately \$1,000 of journal titles. An additional librarian was hired and computer systems in the library were upgraded. Most importantly, the library holdings in the area of environmental chemistry and toxicology were substantially expanded.

Holdings - There was a 32% decrease in the number of book orders placed during FY 1996-1997 due to the continuing increase in the cost of scientific books. There was also a 51% decrease in monographic purchases. Most of the titles that were purchased used grant funds.

In FY 1996-1997, 1,767 records were loaded into the on-line catalog for the NMFS collection. Bar coding and re-labeling of the titles (2,146) and volumes (771) from the NMFS collection was also completed. The COC and MRRI added 246 new titles and 35 volumes. This brings the total title volume count to 20,115. The total number of titles in the cataloged microfiche collection is 542; the total number of pieces in the cataloged microfiche collection is 1,351.

MRL accepted 783 bound journal volumes from the NMFS collection as well as 12 years of unbound issues for journal titles. The librarian cataloged 63 journal titles and updated records for 17 additional journal titles. This information was incorporated into the Charleston Area Libraries Consortium Periodical Holdings List. The library currently receives 436 serial titles through subscription, exchange, donation, and the Federal or State Depository System.

MRL bound 92 volumes for the COC/MRRI and 344 volumes for NMFS. These additions brought the total bound periodical collection to 6,481 volumes.

Student library assistants added 1,500 records to the existing reprint database, which now totals 24,089 articles. Two reprint collections were accepted from NMFS as part of the merger. When they are cataloged the new collections will add 13,000 reprints to the collection.

The merger with the NMFS library almost doubled the size of the MRL newsletter collection. Currently, the library receives 164 newsletters.

The MRL continued its exchange program with 81 exchange partners including foreign and domestic institutions, and participates in Duplicate Exchange Program sponsored by the International Association of Marine and Aquatic Science Libraries and Information Centers. Finally, the library staff updated the Marine Resources Center Publications List and handled requests for copies of the publications.

Library patrons checked out 4,013 books, journals, or reprints during the year. This represents a 10% decrease compared with the previous year. The decrease probably was due to fewer short-term check outs now that the library has a photocopier for public use. The librarians

conducted ten lectures/orientation tours for 166 patrons. In addition, NMFS staff were briefed on library use. Library staff also answered 5,291 reference or directional questions.

Interlibrary loan requests (809) placed by MRL patrons increased 62% during FY 1996-1997. Staff were able to meet 90% of these requests. This increase was the result of more intensive research by the marine biology graduate students, increased usage by MRD staff, and the addition of NMFS as library sponsor. MRL's interlibrary lending increased 30% during FY 1996-1997 with MRL receiving 676 requests from other libraries and supplying materials at a 78% fill rate.

WATER RESOURCES DIVISION

WATER RESOURCES ADVISORY COMMITTEE

Lynn Youmans, Chairman	Furman
Tom W. Dunaway,	Anderson
Whitemarsh S. Smith	Charleston
Earl J. Hayter	Clemson
Houston F. "Dick" Crater, Jr.	Gaffney
Lewis Walker	Sumter
Ben M. Gramling, III	Gramling
Ralph A. "Nick" Odom, Jr.	Fort Mill
Robert M. Rainey	Greenville
Steve Kinard	Charleston

The Water Resources Division conducts programs that foster water resources planning, protection and development. This is accomplished by conducting hydrologic studies of the state's surface and ground waters to insure adequate supplies of water for public supply, industry, recreational users, hydroelectric producers, and ecosystem maintenance. The Division serves as the focal point for climatological matters for State government and provides climate information and services to both public and private sectors. Environmental resource programs include work to control nuisance aquatic plants and animals; environmental permit review; watershed planning studies; administration of the State Scenic Rivers Program; and development of basinwide resource assessments. The Division is developing a digital spatial data base of soils, wetlands, land use, hydrography, transportation, and contours for the Coastal Plain and portions of the Piedmont area of the state. The agency's Home Page was also maintained by the Division.

ENVIRONMENTAL AFFAIRS SECTION

Aquatic Plant And Animal Management

Environmental Permit Review

Laboratory Services

River Conservation Programs

The Environmental Affairs Section is responsible for the state's Aquatic Plant Management Program, zebra mussel program, environmental permit review, provision of laboratory services to other division and agency programs, and several river conservation-related programs. The latter includes the State Scenic Rivers Program, river corridor/watershed planning studies, Adopt-a-Landing, and educational outreach programs such as American Rivers Month and Beach Sweep/River Sweep.

Aquatic Plant and Animal Management - Nuisance aquatic plant and animal populations can adversely impact virtually all beneficial surface water uses including public and industrial supply, electric power generation, navigation and recreation. The Aquatic Plant and Animal Management Program seeks to prevent the introduction and spread of nuisance plants and animals and to manage and control nuisance populations when they occur. Major activities include public education, monitoring of public water bodies and the application of proven and approved control methods.

During FY 1996-97, 20 water bodies were surveyed for nuisance aquatic plants and 19 water bodies (9,971 acres) were managed using herbicides, biological control agents, and water level manipulation. An additional 40,000 acres of hydrilla on the Santee Cooper lakes were

effectively controlled by sterile grass carp stocked in previous years. Staff chaired the Aquatic Plant Management Council which met three times and approved the 1997 Aquatic Plant Management Plan. The cost to control aquatic plants was \$115 per acre (total funds: federal, state and local) with state funds contributing \$12 per acre.

Section staff served as co-chair and directed activities of the Zebra Mussel Task Force. Zebra mussel outreach activities included presentations to interest groups, distribution of informational literature and presentation of displays at various events, expositions, and meetings. Six monitoring stations were sampled monthly for zebra mussel larval and adult life stages. These monitoring stations were located to complement 20 other stations being monitored by the private sector. In addition to regular monitoring, follow-up investigations were conducted in response to reported zebra mussel sightings by the public. Despite the presence of these nuisance animals in nearby states for several years, the zebra mussel is still not known to occur in South Carolina waters.

Environmental Review - The Section coordinates agencywide review of environmental permit applications and other actions affecting natural resources in the 38 non-coastal counties of the state and it provided Water Resources Division input to this review process. This program seeks to insure that DNR comments and positions are scientifically sound, conform to agency policies and procedures, are consistent among projects and that the agency speaks with one voice. During FY 1996-97, 882 non-coastal environmental review requests were received, coordinated, and responses provided. Site visits and coordination meetings were held with DNR staff, regulatory agency staff and permit applicants to evaluate specific projects. Regular coordination meetings were conducted for inter-divisional non-

coastal environmental review staff. At least 95% of DNR recommendations were accepted and implemented by the agency or entity requesting agency review.

Laboratory Services - The Laboratory Services Program provides timely and accurate water quality and related analyses to support other division programs and the agency. During the year, 931 water, sediment, animal tissue and zebra mussel monitoring samples were analyzed, many for multiple parameters, for the Aquatic Plant Management Program, various ground water programs, the Marine Resources Division and other miscellaneous projects. Ninety-five percent of all samples analyzed were completed by the requested deadline. Staff served on DNR's Safety Committee and also as a Safety Delegate for the Water Resources Division.

River Conservation Programs - These programs include the State Scenic Rivers Program, the Watershed and River Corridor Planning Program, and education and public outreach activities related to rivers. The programs identify, protect, and manage the state's outstanding and unique rivers; promote greater understanding of and appreciation for riverine resources; and provide technical and planning assistance to local entities interested in protecting their rivers and associated watersheds. Local values together with good scientific and technical information provide the basis for this planning program. Over 40 presentations on river conservation and management were given to various civic groups, conservation organizations, schools, and professional meetings.

The Scenic Rivers Program is a preservation/conservation oriented program and is mandated to protect unique and outstanding resources as a public trust. This is accomplished by coordinating the program's responsibilities with the appropriate State agencies and riparian landowners in drafting scenic river management plans. Staff coordinated the Broad, Lower Saluda, Lynches and Little Pee Dee Scenic Rivers functions. This included chairing the river's advisory councils and working to develop and/or implement management plans on the rivers. An eligibility study was initiated for the Lumber/Little Pee Dee River above the current designated stretch. Discussions were started with landowners and community interest groups concerning the potential designation of the Ashley River.

Staff coordinate the River Sweep portion of the annual Beach Sweep/River Sweep which is conducted each September. This involves identifying and recruiting volunteer coordinators to organize cleanups on rivers and lakes across the state and develop and publish promotional materials for the event. In 1996, river sweep events included 80 clean-ups on 75 waterbodies involving approximately 7,300 volunteers. Sixty-six tons of trash were collected.

The Adopt-a-Landing Program was officially introduced in June 1996. It is designed to promote the stewardship of South Carolina's boat landings by the citizens who use and appreciate them. The program also serves as a tool to educate the public on the harmful effects that litter has on the environment. Participation in the Adopt-a-Landing Program is open to any community or civic organization, as well as businesses, individuals, and government organizations, that wish to help control litter and improve the environment. A group chooses a specific landing it wishes to "adopt" and removes unsightly debris from the landing three times a year. As of June 30, 1997, 47 landings had been adopted.

HYDROLOGY SECTION

Hydrologic Investigations and Technical Assistance Study and Simulation of Water Resources Systems State Water Plan

This section conducts studies that provide information on the availability of water and the effects of withdrawal, storage, and discharge from streams, lakes, and aquifers. Findings of these studies aid in planning, formulating, and implementing water resources policy and management alternatives to resolve problems related to the competitive usage of water and deterioration of water quality. The section strives to improve the quality and increase the quantity of hydrologic data. This is done through systematic monitoring of local and regional changes in our surface-water and ground-water systems. The section also models these systems to formulate management alternatives that minimize competing and conflicting demands and promote the conjunctive use of surface and ground water.

Hydrologic Investigations and Technical Assistance

Availability Requests: Staff provide information and technical assistance to the general public in the development and use of the State's water resources, including conducting WADI surveys to locate bedrock wells. More than 485 requests for information were processed, including technical assistance and environmental-permit review. The number of users of the real-time hydrologic data was more than 84,000.

Water Well Network: Data are collected and maintained for the major aquifers in the Coastal Plain of South Carolina. Historical water levels for six Black Creek aquifer wells were examined. The final report on the potentiometric surface of the Black Creek aquifer--November 1995 was prepared. More than 120 well sites were visited in November and December 1996 for the Middendorf aquifer potentiometric run. ADRs are maintained at six wells (not including DOE sites).

Hilton Head Project: In order to estimate the impact of shallow-aquifer development on wetlands, saltwater intrusion, and recharge to the upper Floridan aquifer, drainage basins were sampled to determine the salinity of canals and streams. Two observation wells were completed at the Harbor Town study area; a pumping test and the analysis of collected data were completed. Seven continuous cores to a depth of 52 feet were collected; lithology was determined and described. Seven Harbor Town test-site wells were sampled and analyzed.

Aquifer Delineation: Coreholes and monitoring wells were installed at strategic locations in the Coastal Plain of South Carolina, especially in the vicinity of the Savannah River Site. A deep

well (1,138 feet) was completed at Orangeburg. Another deep well (2,900 feet) was completed at Gillisonville in Jasper County. Ten water level recorders were installed. 131 water samples were analyzed for chemical quality.

Black Water: The structure and chemical composition of humic substances and their relation to lead and byproducts of disinfection, mostly those that are carcinogenic, were studied. An open-file report was prepared that included an extended bibliographic reference to current techniques and procedures for isolation and analysis of organic matter.

Geophysical Well Logging. Obtain geophysical data to assist in defining water-bearing units. 61,000 feet of geophysical logs were obtained.

Study and Simulation of Water Resources Systems

Flood/Drought Study: Hydrologic computer models were developed to predict high flows during floods and low flows during droughts. Hydrologic data (streamflow and precipitation) were collected for flood and drought analyses. A plan to establish a comprehensive streamflow data-collection system in Lexington County was finalized.

Santee River Salinity Study: The project's purpose is to define the relationships among salinity, specific conductance, river discharge, and tide stage in the North and South Santee Rivers. An ADR to record specific conductance and temperature was installed in the South Santee River. Nine profiles of salinity and conductance with river depth on the North and South Santee Rivers were conducted at high and low tides. Relationships between river stage and specific conductance were analyzed.

Piedmont Study: To evaluate the ground-water supply potential of Piedmont aquifers, several piezometers were installed in existing wells and water-level and streamflow data were collected and interpreted. Four wells were installed, totaling 404 feet in depth. Instruments were installed on three wells and 102 manual measurements were made in 19 wells. Fifty locations were obtained by GPS. Preliminary data comparisons were made.

Water Use and Demand Assessment: The project's purpose is to assess present use and forecast future water demand and to evaluate ability of water-supply facilities to adequately meet future demands. Where demand may exceed supply, a series of viable water-resources alternatives were provided. A draft report and a map of the distribution and rate of water use for the State in 1994 was prepared.

Spring Inventory. Over 100 springs were searched for and 43 of these were found and added to the inventory (33 in the Piedmont, 10 in the Sandhills and Pee Dee areas) which includes sampling, photographing, and measuring their flow.

Wadmalaw Shallow Aquifer Study. A final report that evaluates the effects of ground-water withdrawals from agricultural irrigation ponds on the shallow sand aquifer and nearby residential wells was edited for publication.

State Water Plan

The plan contains the agency's recommendations on policies the State should adopt for the efficient, equitable, and environmentally responsible management of our water resources. Principal concerns are sustaining the state's natural resources and minimizing damage to them. Four drafts of the Water Plan were prepared; the DNR Board began its initial review.

STATE CLIMATOLOGY OFFICE

State Climate Program

Southeast Regional Climate Center

State Climate Program - The State Climate Office (SCO) serves as South Carolina's climatological focal point by maintaining a comprehensive state climate data and information service. This office compiles, archives, retrieves, and analyzes climatological data necessary for

monitoring environmental conditions. Staff assist state and federal agencies in data acquisition and interpretation before, during, and after severe weather periods. The office also conducts applied climatological studies which provide information relating to interannual and seasonal weather prediction affecting the state's economy and environment. The drought response program develops and monitors drought indices, disseminates drought information, and coordinates local and state responses to drought conditions.

During this fiscal year, the State Climate Office processed 5,549 climate information requests (average of 106.7 requests/week). This represents a 50 percent increase from FY 1995-96. Ninety-eight percent of special climate information requests were satisfied; the less than two percent not serviced were referred to the Southeast Regional Climate Center, National Climatic Data Center, or to private meteorologists. Most unsatisfied requests were expert legal testimony-related and were handled by private meteorologists.

Forty-five monthly climate records were collected each month; hundreds were received, sorted, and archived daily through the National Weather Service (NWS) wire. Fifty weekly weather summaries were published and distributed and are available via Internet. Staff provided 50+ service hours to the Emergency Preparedness Division (EPD) during severe or threatening weather event periods. An additional 80 hours were expended briefing other state officials during these severe or threatening weather event periods. One hundred sixty hours were expended in hazard mitigation efforts/planning, training exercises technical support, and risk analysis report preparation. Staff worked in conjunction with EPD to develop emergency response operating procedures.

SCO Internet Web pages increased from under 500 to more than 1,000. Categories added or expanded include: Drought Pages, Publications and Information, Extreme Weather in South Carolina, and SCO Server Statistics.

Southeast Regional Climate Center - The Southeast Regional Climate Center (SERCC) is a federal grant program administered by the Water Resources Division. Formed in 1989, the Center provides a suite of climate products and services, including climate data and information dissemination to the Southeast region. Member entities include the states of Virginia, North Carolina, South Carolina, Georgia, Alabama, and Florida, as well as Puerto Rico and the U.S. Virgin Islands. Staff assist users in the interpretation and best climate data and information usage with emphasis on interannual and seasonal predictions. Regional climatic conditions and natural resources impacts are monitored and assessed. The SERCC obtains, quality controls, and maintains appropriate datasets to support climate services and applied studies.

During FY 1996-97, about 6,100 (1,524 invoiced) special climate data and information requests were processed. This decrease in invoiced user requests from FY 1995-96 (2,102) was most likely due to large increases in free climate data and information access via the Internet. Requests included statistical programming for hourly weather elements, especially the dew point temperature, wind speed, and direction. For users in the academic community, datasets compiled included climate change, heavy precipitation, and wind speed. Some requests involved research and programming which extends daily and hourly database uses.

1,133,189 log-ins were recorded on the DNR Internet Home Page during FY 1996-97, providing users free climate data and information. SERCC Internet Web pages increased from 1,000 to more than 2,500 during this period. Categories added or expanded include: Education Outreach, Climate Atlas, El Nino/Southern Oscillation, and Monthly Climate Summaries.

Activities during the year included enhanced Internet access and services; expanded scientific applications programming and geographic information systems database development; and quick information provisioning response to the USDA Joint Agricultural Weather Facility.

The following research and development projects were funded:

1. NEXRAD/Lexington County Project - distributing 100+ rain gauges to volunteer users

throughout Lexington County and recording the rainfall data after each rain event.

2. Unified Climate Access Network - development of an interconnected, multiple database standardized computer network under USDA technical guidance.

3. USGS Automated Coastal Meteorological Network - provides baseline climate data for six South Carolina coastal stations.

4. ENSO Correlation - statistical relationships between El Nino and South Carolina climate. This is a developing activity.

NATURAL RESOURCES INFORMATION MANAGEMENT & ANALYSIS SECTION

Data Base Management

Systems and Network Management

Applications Development and Management

This section has developed an integrated approach to systems, data base, and applications management by implementing cross-platform data access and applications protocols. It provides GIS, remote sensing/image processing, cartographic and computer support to the Division. It also manages the Division's extensive data bases which involves the development of digital data for the state for numerous natural resource, climate, and hydrology layers. This digital spatial data base includes soils, wetlands, land use, hydrography, transportation, and contours at 1:24,000-scale and color infrared digital orthophoto quarter-quadrangles at 1:12,000-scale for the Coastal Plain and/or portions of the Piedmont of the state. The section also develops and maintains hardware, software, and network services for Division staff, including the maintenance of the DNR's Home Page on the World Wide Web.

Data Base Management - Staff continued to import and attribute digital line graphs, wetlands and land use, and soils data for various portions of the state. Edgematching, attributing, and quality review were completed for soils, wetlands and land use, and selected digital line graph layers for the Lower Savannah, Combahee-Coosawhatchie, Edisto, Ashley-Cooper, and Lower Santee River basins. In addition, digital line graphs and soils data for the Pee Dee were imported into the Division's geographic information system and edgematching initiated. Digital Orthophoto Quarter Quadrangles were received in "raw" format from the U.S. Geological Survey and currently are being imported into the ERDAS image processing system for resampling and access. The contract with the U.S. Fish and Wildlife Service for development of wetlands/land use maps continued into FY 1997-98. These data are expected in the first quarter of 1998.

The major portion of spatial data base development is jointly funded with federal government mapping agencies or is awarded to private sector vendors through a quality-based technical bid evaluation process. This has allowed the Division to retain minimal staff while obtaining high quality data mapped to National Map Accuracy Standards for 35-50% cost savings.

Because of the constant request for spatial data, NRIMA established the S.C. DNR GIS Data Clearinghouse as part of the DNR World Wide Web Home Page. The clearinghouse provides text or graphic selection and download of available natural resource data. It also provides an overview of GIS initiatives at the Division, descriptions of data layers, and status maps regarding data availability. Users are asked to register with the clearinghouse and vital information regarding the data downloaded and a user profile is recorded in the data base. This allows for summary reports regarding the typical user, the data layers of most interest, and the areas of the state where data are most requested. Such information can be used to guide future mapping and map updates in the state. During the first seven months of operation, more than 4,000 data files were downloaded from a wide variety of government, educational, and private users.

The Division continued its initiative to integrate all climatology, hydrology, and natural resource data into a comprehensive data base management system. Work was completed on the

conversion of the Permit Review (Percomm) data base to Oracle. Current Percomm initiatives include the incorporation of spatial data analysis into the permit review process. The CIRRUS climate data base has been converted to Oracle with a total redesign of the data structure and schema. A windows-driven user interface is being developed for access of the CIRRUS data. Development of a national metadata data base was completed for all regional climate stations across the United States. These metadata will be integrated using Common Object Request Brokerage Agent (CORBA) technology to provide national access to regional climate data bases as part of the Unified Climate Access Network (UCAN) initiatives. Similarly, freshwater fisheries data are being integrated into the Division's Oracle data base and web browser access tools developed to provide remote office access and query of the data.

Systems & Network Management

NRIMA completed the upgrade of Division servers and personal computer workstations. All non-Pentium processors were upgraded to a 586-Pentium standard with a minimum 1 gigabyte disk, CD-ROM, and 16 megabytes of memory running Windows 95. The office automation software suite was upgraded to include Divisional scheduling and file sharing, WordPerfect 7.0, and Microsoft Office professional suite. Similarly, commonly accessed DNR forms and templates were created in WordPerfect and loaded on the primary server for access by all staff.

A second Windows NT server was installed to provide redundancy for office automation in the event of failure in the primary server. Several graphics software systems including Arcview, Surfer and Grapher also were installed on this server to distribute data processing more evenly across platforms.

The World Wide Web (WWW) home pages were maintained and expanded to include information from other Division sections and DNR divisions. New pages were established for the River Conservation Program, Administrative Services/Procurement Section, Marine Resources, and others.

Applications Development & Management

GIS analyses were conducted to support both Divisional and external projects. Cartographic products were generated to support the River Conservation projects in the Lynches and Little Pee Dee River basins. A grant was awarded to the Division by the EPA to conduct river corridor planning studies in the Reedy River which included GIS data base development and analysis. Work continued on the development of GIS-based analysis to support the DNR permit review (Percomm) program. Graphics were generated to support aquatic plant management studies in Lakes Marion and Murray and to support a statewide reservoir siting model. Approximately 260 maps, tables, charts, and graphics were digitized or otherwise generated for inclusion into reports, slides, or other presentation media. Outside the Division, maps were provided to the Law Enforcement Division to facilitate emergency planning in the forty-six counties and to support search and rescue flight planning and to plan raptor monitoring transects. Maps were also produced for the Wildlife and Freshwater Fisheries Division to support hunting program initiatives in various portions of the state.

WILDLIFE AND FRESHWATER FISHERIES DIVISION

Wildlife and Freshwater Fisheries Advisory Committee

Campbell D. Coxe, Chairman	Darlington
Ed Muckenfuss, Vice Chairman	Summerville
Paul L. Wright	Greenville
Milton L. Brazell	Edisto Island
Joe Chapman	Dorchester
John E. Tanner	Hemmingway
Allen Cauthen, Jr.	Lancaster
Harry W. Kinard	Spartanburg
Tom Eleazer	Columbia
Obie Stokes	Florence

WILDLIFE MANAGEMENT SECTION

The primary objective of the Wildlife Management Section is to provide the best possible hunting opportunities for the sportsmen of South Carolina while ensuring the well being of all wildlife species. This objective is accomplished by providing technical assistance to landowners, conducting mission-oriented research and most importantly, operating a wildlife management area (WMA) program open for public hunting. During FY 1996-97, 1,253,314 acres of land were open to the public for hunting, and a total of 58,111 WMA permits were sold. Harvests of 62,116 deer and 13,984 turkey were recorded at department check stations. Turkey tags were issued to 35,459 hunters during the 1997 spring turkey season. Fifty-three public dove fields (2271 acres) were available across the state. 1647 hunters participated in 94 public waterfowl hunts with a reported harvest of 2655 ducks. A 12-day Canada goose season was held with 5833 permits issued and 1812 geese harvested. The efficiency of the WMA program is reflected in the cost accrued to provide public hunting land. Payment to landowners to lease hunting land during 1996 was \$2.62/acre for corporate land and \$0.41/acre for Forest Service land. The average cost per acre to lease public dove fields was \$0.92/acre.

The Wildlife Management Section's public relations activities are important in informing the public of management programs. Section staff made 382 public presentations before audiences of 22,001, prepared over 59 news releases, and developed technical management plans for a minimum of 590 landowners. Deer data analysis was provided to over 1500 hunt clubs. Section staff conduct numerous scientific wildlife surveys in order to monitor populations including 14 dove call count surveys, 52 quail surveys, 164 furbearer surveys, 32 waterfowl surveys, 12 alligator surveys and soft and hard mast surveys to look at wildlife food production. Staff investigated 1382 nuisance wildlife calls during the year and provided comments on 6 environmental review notices. Other state and federal agencies were assisted with technical information on 305 occasions requiring 109 mandays effort.

Field habitat management operations included 3782 acres planted, 2498 acres mowed, 6962 acres disced, 14,757 acres prescribe burned, 3399 acres fertilized, 630 acres limed, 1118 acres treated with herbicide for weed control, over 2.4 million linear feet of dike mowed, 480 miles of roads maintained and 6,089 WMA and other signs posted on over 550 miles of boundaries.

The state is divided into six wildlife regions with a regional biologist responsible for all wildlife management activities within a region. Statewide project supervisors for major wildlife groups coordinate data collection, research, and surveys including deer, turkey, waterfowl, small game, furbearers, and alligator. Supervision is accomplished by periodic inspections of the various projects, office conferences and reviewing reports and management plans. The actual

performance of each project is tracked through department accounting records.

The following is a summary of the various wildlife management area and statewide projects throughout the state.

Wildlife Region I (Anderson, Greenville, Oconee and Pickens Counties)

A total of 213,000 acres of land were available for outdoor recreation during 1996-97. Deer hunters reported harvesting 4,244 deer (2,870 bucks and 1,374 does), an increase of five percent over the previous season. Turkey hunters harvested 1,075 birds, an increase of seven percent. Sportsmen harvested 14 bear, an increase of 17 percent. Three waterfowl areas were managed. Technicians planted nine public dove fields in the region including two adult/child fields. Staff sampled five of these fields on opening day. Three hundred and eighty-four hunters shot 22,696 shells and harvested 1,181 doves on these fields.

Wildlife Region II (Abbeville, Aiken, Edgefield, Greenwood, McCormick, Saluda Lexington, Richland and Calhoun Counties)

Deer hunters in the Western Piedmont Hunt Unit, which includes about 224,000 acres of public hunting lands in Abbeville, Edgefield, Greenwood, McCormick and Saluda Counties, checked 20,796 deer, a one percent decrease from the previous year. This equates to a harvest of 12.3 deer per square mile of habitat. The number of females in the harvest increased slightly to 42.3 percent. Wild turkey harvest during the Spring of 1997 was 2,081 birds, a 6 percent increase from the previous spring. The sixth Canada goose season was conducted with a reported harvest of 356 geese taken by 262 hunters. This was a decrease in reported harvest and number of hunters; however, the return rate on questionnaires was the lowest ever. Eleven public dove fields were provided, including one adult-child field.

The Crackerneck WMA in Aiken County provided recreation for 2,682 hunters and fishermen with 135 deer, 15 wild turkeys, 25 feral hogs, 75 ducks, 49 bobwhites, 37 squirrels and a variety of other small game and fish being harvested. The project biologist spent 39 days in conducting the hunts on Crackerneck. Data were also collected on 204 wild turkeys taken from the rest of Aiken County.

In cooperation with the Wildlife Diversity Section, Region II personnel constructed about 3 miles of firebreaks and painted boundary lines on the Henderson and Gopher Tortoise Heritage Preserves in Aiken County. The boundary line on the Stevens Creek Heritage Preserve in McCormick County was painted and posted with WMA and HP signs. On the Janet Harrison Heritage Preserve, Region II equipment was used to move fill material for wetlands restoration.

On Crackerneck WMA, 70 acres of annuals and 10 acres of perennials were planted, 45 miles of road were mowed, and 99 acres fertilized. 20,000 bicolor lespedeza seedlings and 200 oak trees were planted with cooperation from Quail Unlimited and the USFS. Twenty-three wood duck nest boxes were checked four times. Four wood ducks were banded and four previously banded birds recaptured.

Assistance was provided to the S.C. Forestry Commission in marking about 250 acres of timber on the Mason Property and preparing the necessary documents to conduct the first timber sale on the property.

Wildlife Region III (Cherokee, Chester, Chesterfield, Fairfield, Kershaw, Lancaster, Laurens, Newberry, Spartanburg, Union and York Counties)

During 1996-97, 378,412 acres of Wildlife Management Area (WMA) lands were available for public recreation within the region. Big game check stations were provided at 133 sites to allow monitoring of big game harvests for maintaining healthy wildlife populations. The varied wildlife resources and associated recreational opportunities create significant interest and enjoyment among both residents and visitors.

The region's most popular wildlife related activity was hunting for white-tailed deer. Sixteen days of archery hunts, 9 days of muzzle loader hunts, 59 days of still gun hunts and 18 days of

either-sex deer hunts were available within the Central Piedmont. This year 35,073 deer (21,126 bucks, 13,947 does) were reported harvested and this represented less than a one percent increase from the 1995-96 harvest. Forty percent of the 1996-97 harvest was does.

Spring turkey hunting was available for 27 days from April 1 - May 1 and 4,984 turkeys were reported harvested. This year's spring turkey harvest was less than one percent greater than the previous year's harvest and hunters were issued 10,243 sets of turkey tags.

Eight public waterfowl hunts were held at each of the Broad River and Enoree River Waterfowl Management Areas with a total of 128 hunters being accommodated. Opportunity to participate in these hunts was available through application and computer drawing. The combined hunter success for both areas was 2.02 ducks per hunter.

Participation in the region's public dove field program was significant with 17 fields available for public hunting within the Central Piedmont Region. During the 1996 opening day hunts, 930 hunters fired 22,920 shots (25 shots per hunter) and harvested 2,203 doves (8.5 shots per bird).

Canada goose trapping, banding and relocation was conducted at various sites within the region during the year. Nuisance geese were trapped from private areas in Chester, Lexington, Richland, Sumter, Union and York counties. The total trapping effort included 525 geese trapped (341 adults, 184 goslings), 6 were previously collared and 47 had been previously banded. The remaining 478 geese were banded. Twenty collar sightings have currently been reported. Future reports of numbered neck collared birds along with other banding data will be used to determine movement patterns, survival rates and population estimates. This information will be utilized to prepare future harvest recommendations. Ninety-four wild turkeys (38 gobblers and 56 hens) were trapped and relocated in cooperation with the state turkey restoration program.

Habitat for small game species was enhanced at a number of sites. A quail management demonstration area (1,260 acres) was maintained on WMA property owned by Champion International Corporation in Newberry County. At this area, 15 acres of linear food strips and other plantings were established for quail in cooperation with the Newberry Chapter of Quail Unlimited. Twenty acres of Duke Power Company rights-of-way located on WMA property within the region were planted in linear wildlife food strips. Two wild turkey management demonstration areas were maintained on WMA property owned by Bowater Incorporated in Union County (503 acres) and in Chester County (1,390 acres).

The Sand Hills State Forest in Chesterfield and Darlington counties was provided technical assistance in further developing wildlife habitat. Quail and furbearer surveys were conducted and a public dove field was prepared. Nine big game check stations were maintained for collecting biological data.

Wildlife mortality at the Kennecott Ridgeway Mining Company facility in Fairfield County near the town of Ridgeway was carefully monitored through direct observation and counts of wildlife using the area. Wildlife observations averaged 2,104 per month and 26 mortality cases were documented this year. Goldmine and wildlife personnel are continuing to evaluate a variety of alternatives in an attempt to eliminate or reduce this mortality. A wildlife habitat development plan has been prepared for goldmine project lands adjacent to the mining facilities and efforts continued this year with the maintenance of wildlife openings and the annual preparation of a public dove field.

Wildlife Region IV (Berkeley, Charleston, Clarendon, Dorchester, Orangeburg and Williamsburg counties)

The program objective of Wildlife Region IV is to employ the best possible wildlife management techniques to provide public hunting and other recreational activities and opportunities for the sportsmen of South Carolina. This objective is accomplished by conducting a professional wildlife management program on the 251,705 acre Francis Marion Hunt Unit, 9,480 acre Moultrie WMA, 3,222 acre Santee Cooper Wildlife Management Area, the 2,484 acre Hatchery Waterfowl

Management Area, the 2,491 acre Canal Wildlife Management Area, and the 750 acre Sandy Beach Waterfowl Management Area and by providing technical wildlife management assistance to private landowners.

During the 1996-97 deer season, deer harvest in the region increased significantly with a minimum reported harvest of 30,996 deer (15,063 bucks and 15,933 does).

The 1997 spring wild turkey gobbler season in the region produced 1,987 turkeys with 82 of these being checked from the Francis Marion Hunt Unit. The Adult-Child hunts on Santee Cooper WMA resulted in 11 parties taking 4 gobblers.

Seven black bear complaints were handled during the summer. One bear was trapped and relocated.

A deer management initiative for the Francis Marion Hunt Unit was continued in cooperation with the U.S. Forest Service and the Law Enforcement Division. Assistance was given to the Law Enforcement Division in patrolling the Hunt Unit.

One hundred and eighty-three (183) Canada geese were live-trapped in Berkeley and Orangeburg counties and relocated throughout the Coastal plain. An early season for resident Canada geese was opened on Lake Marion and Clarendon County.

Sixty-three deer (24 bucks, 39 does) were taken on the Santee Cooper Wildlife Management Area during three weeks of archery and primitive weapons hunting and a special drawn still-gun hunt. Seventy-two drawn duck hunters participated in six public hunts held on the Santee Cooper Wildlife Management Area during the 1996-97 waterfowl season. These hunters harvested 271 ducks, for an average of 3.8 ducks/gun. Three hundred and ninety-seven hunters were checked during the eight public waterfowl hunts conducted on the Hatchery Waterfowl Management Area in 1996-97. These hunters harvested 377 ducks, for an average of .96 ducks/gun. On Sandy Beach Waterfowl Area, thirty-one drawn hunters harvested 61 ducks for an average of 2.0 ducks/gun. Twenty-one youth participated in special youth waterfowl hunts held on the three waterfowl areas in the region. Total deer harvest on the Francis Marion Hunt Unit increased from the previous year, to 773. Seventy-four deer (44 bucks, 30 does) were taken on Moultrie WMA. The four public dove fields within the Region were good. On the Santee Cooper Wildlife Management Area approximately 125 public dove and waterfowl hunters took an estimated 225 doves. The Canal Wildlife Management Area dove fields were good, with approximately 500 hunters taking over 2,000 doves. The parent-child dove field on the Santee WMA provided hunting opportunity for 63 hunters who took 104 doves.

Project personnel continued dove trapping and banding for a dove research project on two study areas (Berkeley-Orangeburg counties and Marlboro County). The objective of this study is to determine preseason population densities, harvest rates in the local population, productivity and annual survival rates.

Eight students from Macedonia Middle School participated in the mentor program established between the Department and the school.

A cooperative longleaf pine planting and wildlife opening development program was continued on Santee Cooper Wildlife Management Area in cooperation with the S.C. Public Service Authority and the Orangeburg Chapter of Quail Unlimited.

A wildlife and forestry demonstration area was maintained at Camp Harry Daniels in cooperation with S.C. State University and the U.S. Forest Service.

The C.A.W.S. Basin Project is guided by a task force that meets monthly. Regular participants include several private landowners, two land trusts, four other conservation organizations and three public agencies. Many other landowners, organizations and agencies support the project and assist on an "as needed" basis. Numerous landowners have been contacted about the project through workshops, meetings, and personal contacts. Land protection priorities have been developed and strategies initiated to protect those with the highest priority. Much of the

area is owned by corporate landowners and one major effort is to develop ways they can protect their properties and defend these actions to their shareholders. Several properties are moving toward protection actions.

The Santee Cooper Lakes Focus Area is an area including a major reservoir system of which a good deal is in public ownership. Strategies are being evaluated to improve management on the publicly owned lands and connect them with corridors of privately owned land managed in a compatible manner.

Five hundred (500) persimmon trees planted on the Francis Marion Hunt Unit in cooperation with the Hellhole Coon Hunters Association, the Furbearer Project and the U.S. Forest Service were evaluated to determine the best planting technique and method. Survival of the trees was near 100 percent. These trees will help compensate for the loss of mast production due to Hurricane Hugo.

A deer hunt for handicapped individuals has been held on the South Tibwin portion of the Francis Marion Hunt Unit in cooperation with the U.S. Forest Service.

Special feral hog hunts have been initiated on the Waterhorn and Hellhole WMA's of the Francis Marion during July and January-February of each year.

A new water control structure was installed, canals cleaned, and the pump bulkhead reworked on Sandy Beach WMA. All impoundments were cleaned of debris and disced to set back plant succession or to plant waterfowl food plants.

Six gates were installed on the new Dungannon Heritage Preserve Tract and boundary signs posted on this tract and the new Francis Marion Tibwin property.

A status report on the Francis Marion deer hunting with dog situation was completed and presented to the DNR Board. A letter from DNR Board Chairman Graham was mailed to Francis Marion hunters requesting cooperation during the 1997-98 deer season.

Wildlife Region V (Allendale, Barnwell, Bamberg, Beaufort, Colleton, Hampton and Jasper counties).

Primary activities in Wildlife Region V are management of public lands for outdoor recreation including public hunting, assisting private landowners with natural resource management on their lands, working with other public agencies on natural resource issues and public education about natural resource management. These objectives were accomplished in 1996-97 on 20,744 acres of both state-owned wildlife management area (WMA) lands and cooperative WMA lands which were either leased by the South Carolina Department of Natural Resources (SCDNR) or under management agreement with SCDNR. State-owned WMA lands included Webb WMA (5,866 acres), Victoria Bluff Heritage Preserve WMA (800 acres), Tillman Sand Ridge Heritage Preserve WMA (952 acres) and Turtle Island WMA (1,700 acres). Cooperative lands included Palachucola WMA (6,757 acres), Cypress Creek WMA (4,029 acres) and smaller WMA tracts (640 acres) owned by Union Camp and Bowater timber companies.

Public hunts required about 1,200 man/days or 40 percent of region five personnel time this year. A total of 518 deer (260 bucks and 258 does) were reported harvested on WMA lands. In addition to deer hunts, public hunting opportunities for wild turkey, small game and feral hogs were provided on WMA lands. Generally good hunting success was reported by public hunters.

The reported deer harvest from privately owned lands in this region in 1995-96 was 32,488 deer, up significantly (14.6%) from 28,337 in 1995-96. Harvest by sex was 15,323 bucks (47%) and 17,165 does (53 %). Total reported harvest by county was Allendale - 5,302 (56% female), Bamberg - 4,335 (52% female), Barnwell - 2,569 (53% female), Beaufort - 2,150 (57% female), Colleton - 6,201 (50% female), Hampton - 7,269 (53% female), and Jasper - 4,662 (52% female). The percent male fawns in the antlerless harvest was 9.2% for the region. From 1984 to 1996 the total reported harvest has increased from 16,591 to 32,488, the percent harvest of females has increased from 32% to 53% and the percent of male fawns in the antlerless harvest has

decreased from 14.2% to 9.2%.

During the 1997 spring turkey hunting season, 4,506 sets of turkey tags were issued and 2,357 turkey gobblers were reported harvested in this region. Number of tags issued were up 8% from 4,155 in 1996. Gobbler harvest was up 17% from 2,011 in 1996. Reported harvest by county was Allendale - 315 (up 31%), Bamberg - 322 (down 8%), Barnwell - 207 (up 8%), Beaufort - 60 (down 24%), Colleton - 629 (up 34%), Hampton - 454 (up 12%), and Jasper - 370 (up 35%). Turkey harvest on WMAs in the region was 45 gobblers, up from 31 (an increase of 45%) in 1996.

No new timber sales were held on Webb or Palachucola WMAs this year. Timber cutting under sales 3-31, 3-32, and 3-33 on Webb and sales Pal-2, Pal-3, and Pal-4 on Palachucola were completed. Ninety acres were planted in longleaf pines by a contractor on Palachucola. Herbicide was applied by a contractor to 220 acres of longleaf pine sites on Palachucola for site preparation and release. Twenty-five new wildlife openings (50 acres) were cleared on Palachucola.

Wildlife Region VI (Darlington, Dillon, Florence, Georgetown, Horry, Lee, Marion, Marlboro, and Sumter Counties)

The program objective of Wildlife Region VI is to employ the most appropriate wildlife management techniques and practices to provide sportsmen and other outdoor users with opportunities for public hunting and other recreational activities. This is accomplished by conducting a professional wildlife management program on 74,144 acres of wildlife management area (WMA) lands. These include the South Carolina Public Service Authority (SCPSA) Pee Dee Station Site (2,701 A.), Lake Wallace (1,000 A.), Manchester State Forest (MSF 16,000 A.), Marsh Furniture (8,044 A.), Tilghman Heritage Preserve (HP) (456 A.), Dargan, Ward & Upper Gunters Island HPs (4,672 A.), Lewis Ocean Bay HP (9,343 A.), Great Pee Dee River HP (2,725 A.), Little Pee Dee River HP (3,771 A.), Lynchburg Savanna HP (291 A.), Cartwheel Bay HP (568 A.), Waccamaw River HP (5,192 A.) and miscellaneous WMA lands (18,568 A.). This objective is also accomplished by providing technical wildlife management assistance to private landowners, leasees, and other groups and individuals.

Reported deer harvest throughout the nine county region in 1996 was 16,402 (7,629 bucks and 8,773 does). This exceeded the 1995 harvest of 6,699 bucks and 7,846 does by 12.77 percent, and it represented a 126.42 percent increase over the 1986 harvest. The known WMA deer harvest totaled 291 from the following public hunting areas: Lewis Ocean Bay HP (3), MSF (207), Marsh Furniture WMA (33), Pee Dee Station Site WMA (23), Great Pee Dee River HP (23), and Waccamaw River HP (2).

The 1997 spring wild turkey season resulted in a harvest of 1,119 gobblers from the following counties: Darlington (84), Dillon (41), Florence (187), Georgetown (296), Horry (71), Lee (88), Marion (175), Marlboro (72), and Sumter (104). These figures include 21 gobblers taken from public hunting areas. This represents a 20.84 percent increase over the 1996 harvest of 926 gobblers and a 31.96 percent increase over the 1992 harvest of 848 gobblers.

Wildlife restocking continued to receive some attention with the release of 30 wild turkeys (10 gobblers and 20 hens) on 2 restoration sites in Georgetown and Horry counties. Since 1976, 90 sites in 9 counties have been restocked with 1,433 wild turkeys (471 gobblers and 942 hens).

Wildlife habitat development activities on wildlife management areas included clearing and seedbed preparation, planting, and maintenance of wildlife food plots consumed approximately 160 man days or 14.5 percent of project activities.

ACE Basin Project

The Ashepoo, Combahee and Edisto (ACE) River Basin Project is a comprehensive, multifaceted effort to protect in perpetuity a nationally significant 350,000 acre coastal wetland ecosystem. Wetlands within the project area provide critical habitat for resident and migratory waterfowl as well as a wealth of other wetlands-dependent wildlife species including five federally-

listed endangered/threatened species (southern bald eagle, wood stork, shortnose sturgeon, American alligator, and loggerhead sea turtle). Accordingly, the project area, representing one on the largest undeveloped wetland complexes along the Atlantic Coast, has been identified as a principal focus area of the North American Waterfowl Management Plan's Atlantic Coast Joint Venture.

The project is jointly funded and directed by the ACE Basin Task Force consisting of: S.C. Department of Natural Resources (SCDNR), Ducks Unlimited (DU), The Nature Conservancy (TNC), U. S. Fish and Wildlife Service (USFWS) and private landowners. To date 126,621 acres of land have been afforded permanent protection. Specific protection accomplishments in 1996-1997 include the placement of conservation easements on 3,854 acres. Conservation easements now total 43,249 acres.

DNR staff provided technical and logistical support in the efforts to protect these properties. Two issues of "*Current Events*", the ACE Basin newsletter were produced and distributed. Wildlife management staff made 23 presentations (including tours) to over 597 individuals.

Donnelley Wildlife Management Area

A part of Wildlife District VIII, Donnelley is located in eastern Colleton County adjacent to U.S. Highway 17 near Green Pond. Donnelley was named in honor of the late Gaylord Donnelley and his wife Dorothy for contributions they made to the ACE Basin Project and conservation across the continent. This unique property of 8,048 acres encompasses a diversity of wetland and upland habitat types including: managed wetlands, backwaters, forested wetlands, tidal marshes, agricultural fields and a variety of forest types. The objectives on Donnelley are intensive management to provide optimum habitat for resident and migratory wildlife and to provide a variety of recreational opportunities for the general public. To meet these objectives the following activities were performed during 1996-1997:

A total of 180 acres of agricultural plantings were made for public dove fields. Prescribed burning was conducted on 2,660 acres of uplands to improve wildlife habitat. Water level management and agricultural plantings were utilized on 2,046 acres of wetlands to provide wintering waterfowl and wading bird habitat. In conjunction with wetlands management, 42,240 linear feet of dike were maintained by rotary mowing. Thirty-three miles of roads were maintained by rotary mowing and grading. Thirty-five acres of wildlife openings were maintained to provide food and cover for forest dwelling wildlife. One hundred fifty-three wood duck boxes were maintained. The public hunting program provided 1,899 man-days of recreational opportunities for dove, rabbit, quail, raccoon, squirrel, snipe, deer and waterfowl. Donnelley also provided considerable recreation to appreciative users including birdwatchers, hikers, and photographers. A minimum of 1,915 individuals visited the area. Organized groups using Donnelley for educational purposes included school groups, teacher workshops and conservation organizations.

Bear Island Wildlife Management Area

Bear Island Wildlife Management Area, Wildlife District VIII, is located in Colleton County, and consists of approximately 12,000 acres including 5,319 acres of managed wetlands; 5,005 acres of tidal marsh; 1,227 acres of woodlands and 404 acres of agricultural land. The objectives on Bear Island are intensive management to provide optimum habitat for resident and migratory wildlife and to provide compatible recreational opportunities for the general public. To meet these objectives the following activities were performed during 1996-1997.

Active water level manipulation was practiced on the managed wetlands to provide optimum habitat conditions for resident and wintering waterfowl, shorebirds and wading birds. In conjunction with wetlands management, maintenance was performed on 60 water control structures and 90 miles of dikes, roads and trails. One hundred seventy acres of agricultural fields were planted and manipulated to provide foraging habitat for upland wildlife.

The public hunting program provided 1,265 man days of recreational opportunity for waterfowl,

dove, rabbit, raccoon, snipe, quail, squirrel and deer. Seven group tours were provided to 125 people. Public fishing on the area (April 1 - September 30) provided an estimated 5,000 man-days of recreation. Other recreational uses of Bear Island including birdwatching, hiking and wildlife photography provided an estimated 3,000 man-days of recreation.

Bear Island provides camping facilities and accommodated a variety of groups including universities, high school classes, Scout troops and other conservation groups. Personnel provided numerous tours and educational programs to these and similar groups.

Santee Coastal Reserve State Project

Santee Coastal Reserve is located in southeastern Georgetown County and northeastern Charleston County between the North Santee River and Cape Romain National Wildlife Refuge. It consists of two barrier islands and a mainland portion. Eleven thousand, six hundred and sixty-one acres of impoundments are managed for wintering waterfowl. Waterfowl numbers on SCR during the annual cooperative Mid-Winter Survey were 11,518. The southernmost flock of lesser snow geese in eastern North America overwinters here. The upland acreage of the mainland is managed for public deer hunting. Twenty-two deer were harvested during the 1996-97 season. The area is open for public archery hunts during the first and last complete weeks in October. Santee Reserve is managed as a multiple-use area with waterfowl as the featured species group. Other target species include deer, turkey, Atlantic loggerhead sea turtles, bald eagles, red-cockaded woodpeckers, osprey, quail, and numerous wading and shorebirds. Two thousand wood duck nest boxes are constructed on this project annually for free distribution to private landowners. Public utilization of the area is high for a Wildlife Management Area with over 10,000 annual man-use days. This utilization includes camping, hiking, guided tours, hunting fishing, outdoor academic classes and bird watching. All interpretive signs on all 4 trails are color coded and keyed to a large map at the trailhead kiosk. Guided tours and technical and non-technical lectures were presented to over 1,000 visitors. Sixty acres of forest openings are planted for forest birds and mammals. Waterfowl and shorebird management is accomplished by water level manipulation in the impoundments. One hundred and four pair of endangered wood storks were documented as nesting on SCR this spring. Documented wading bird nesting included the following: anhinga - 116, great blue heron - 52, great egret - 401, and osprey - 40. Bald eagle production in the West Territory was 2 chicks with a total of 6 chicks produced on the entire property. The South Carolina Forestry Commission manages timber sales and cutting operations. Additionally the South Carolina Department of Natural Resources manages the 1,100 acre Washo Reserve through cooperative agreement with The Nature Conservancy. Utilization of the 800 foot boardwalk in the Washo Reserve is at an all-time high. Boardwalks and wildlife observation blinds have been maintained in conjunction with the Marshland Nature Trail and the Bike/Hike Trail. All nature trails, hiking trails, and canoe trails are maintained and are open for public use. Current research projects include thermo-regulation in alligators, shot ingestion by wintering waterfowl, the prevalence of the hanta virus in small rodents, and the construction of a computer model to predict salinity in the Santee River estuary. Annual surveys are conducted on mottled duck production, wintering waterfowl, wading birds, shore birds, migrating raptors, herptiles, butterflies, wood duck production, red-cockaded woodpeckers, and neo-tropical migrant birds.

The Santee River Focus Area

The Santee River Focus Area (SRFA) is a South Carolina component of the Atlantic Coast Joint Venture (ACJV). This cooperative effort is one of several Joint Ventures that make up the North American Waterfowl Management Plan (NAWMP).

The objective of the SRFA simply stated is to protect, preserve, and enhance wetland wildlife habitat in the Santee River flood plain. The SRFA is administered by a Task Force comprised of private landowners, the Historic Ricefields Association, the U.S. Forest Service, Ducks Unlimited, the U.S. Fish and Wildlife Service, and the S.C. Department of Natural Resources.

This Focus Area includes the flood plain of the Santee River from Santee Dam to the Atlantic Ocean at Cedar Island, involving portions of Berkeley, Charleston, Clarendon, Georgetown, and Williamsburg Counties. The coastal marshes of the Santee River Focus Area occupy 99,268 acres, including 22,300 acres of managed wetlands. This marsh acreage represents 32% of the state total.

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) determined that this portion of South Carolina was important enough to be designated a Biosphere Reserve, the Carolinian-South Atlantic Reserve. This international designation was launched in 1971 to provide knowledge, skills, and human values to support harmonious relationships between people and their environment throughout the world.

The Project area is comprised of approximately 575,000 acres. The importance of this area to wildlife has been evident for decades as the Cape Romain National Wildlife Refuge was established in 1932 and the Francis Marion National Forest was established in 1936.

A large portion (>36%) of the SRFA is currently protected.

Furbearer Project

Technical assistance: Seven hundred and four depredation permits were issued statewide to property owners suffering damages from nuisance furbearers. Numerous on site visits were made to assist landowners with animal damage control. Three beaver control workshops were conducted for landowners dealing with nuisance beaver situations. A total of 110 individuals participate in these workshops. A Nuisance Wildlife Control Operator's List was produced to provide the names of companies and individuals providing service in each county. One hundred seventy-four participants were enlisted. Technical assistance brochures, slide programs and videos were developed and distributed to assist landowners in controlling nuisance furbearers. Numerous meetings and workshops were held with local fox hunting, raccoon hunting and trapping organizations to address regional furbearer matters.

Education: Eleven presentations were made to various school classes, teacher workshops, university seminars and sportsmen groups with a total audience of 487 individuals. Two trapper education classes were conducted to teach ethics and responsibility and to provide a basic understanding of the biological basis for managing furbearers. Thirty individuals received trapper education certificates. Four presentations on furbearer research and management were given at professional conferences. Five news articles were written and numerous interviews granted to news and magazine writers on furbearer related subjects. The bi-annual furbearer news bulletin was produced. This year's issues included fifteen articles on furbearer management related subjects. A statewide youth raccoon hunting championship event was hosted with 28 youths in attendance. The event included seminars on sportsmanship, gun safety and compass navigation.

Harvest Monitoring: The level of commercial fur harvest is monitored annually through mandatory reports of commercial licensees and through a fur tagging system. These surveys revealed that fur values for most species improved again this year. Overall, fur values remained well below the levels of the early 1980's but are approaching levels which are expected to result in increased participation by sport trappers. The annual requirements outlined by the Convention on International Trade on Endangered Species (CITES) were submitted to the U. S. Fish and Wildlife Service for export approval of South Carolina bobcat and river otter pelts. Population trends and harvest estimates were predicted in order to justify the continued harvest of these two species.

Population Monitoring: The annual Scent Station Survey included 1,590 tracking stations to determine the relative abundance of bobcats, foxes, raccoons and free ranging dogs. The annual Raccoon Field Trial Survey was conducted to analyze raccoon hunting success data for comparisons between regions, years and seasons within years. This year's survey recorded the hunting success of 1,294 hunt parties. The invasion of coyotes into South Carolina continues to

be monitored. Current information indicates that the animals are established in all counties bordering the Savannah River. Random observations of coyotes have occurred in nearly two-thirds of the remainder of the state. Furbearer population monitoring through determination of age structure continues using a process of cementum analysis.

Habitat Improvement: An evaluation was conducted to compare the growth rates of persimmon seedlings under various planting regimes on the Francis Marion National Forest. Soft-mast restoration projects were initiated on the Donnelley, Webb Center and Palachucola Wildlife Management Areas.

Research: Furbearer related research included:

- 1) An evaluation of the policies, laws and attitudes toward fox hunting enclosures in the southeastern states.
- 2) Participation in regional and international efforts to develop international humane trap standards.
- 3) Validation of the Scent Station Survey and Raccoon Field Trial Survey using known levels of raccoon population reduction.
- 4) Determination of the distribution of mink in South Carolina tidal marshes.

Two fifty-one fox and raccoon field trial permits and 24 fox running pen permits were issued.

Statewide Deer Project

Deer Harvest Summary: The annual statewide deer harvest summary was completed, printed, and distributed. This task revealed that during the deer season of 1996, a minimum of 163,758 deer were taken in South Carolina. This included 81,981 bucks and 75,873 does taken by hunters and 5,904 deer of unknown sex that were struck by vehicles. These figures represent the greatest number of deer ever reported taken in South Carolina. Harvest figures for 1996 showed a 10.5% increase over 1995. Harvest trends in the 28 county coastal region rose sharply (15.8%) however, 1996 marked the fourth consecutive year more female deer (52%) were harvested in this region than male deer (48%). Mean harvest increment in the coastal plain since 1990 is 3.2%. Harvest trends in the piedmont and mountains were stable in 1996 as compared to 1995. Male deer (60%) continue to be harvested more frequently than females (40%). Mean harvest increment in the upstate since 1990 is 6.2%.

Antlerless Deer Quota Program: The Antlerless Deer Quota Program for the 28 county coastal plain area was administered by the Deer Project. This program was modified several years ago to include a choice of either-sex days or tags and a \$50 application fee was established. In 1996 75,066 tags were issued to 2,688 cooperators on over 4.5 million acres of land. In addition, over \$140,000 was collected, deposited and expended as required by the enabling law.

Piedmont Antlerless Deer Tag Program: The antlerless deer tag program for the piedmont was administered resulting in the issuance of 76,515 tags to approximately 22,320 applicants. Over \$375,000 was collected, deposited and expended as required by the enabling law.

Antler Records Program: Wildlife Management Section biologists conducted 20 antler scoring sessions during the year, at which, 408 sets of antlers were scored using the Boone and Crockett system. This effort resulted in the addition of 131 sets of antlers to the state records list. Data for the successful heads were entered, verified and edited and certificates were mailed to each owner. A total of 3,178 sets of antlers have qualified and are included on the Antler Records List since the program's inception in 1974.

Cooperative Deer Management Program: Harvest data was received from approximately 1,400 hunt clubs during 1996-97. Each club that cooperated in the program was provided with an analysis of its respective data and harvest recommendations for the 1997 season were made.

Deer Depredation Program: The Deer Project assisted the Law Enforcement Division in administering the depredation program. This project involved the purchase of tags, the printing

of necessary forms, file maintenance and record updating. During 1996, 709 depredation permits were issued statewide.

Research: The Deer Project was involved in six research efforts during the year. The first project was completed during 1996 and involved a four year study concerning crop damage and deer densities in Hampton and Jasper Counties. In this study, monitoring of crop damage and deer condition were conducted through a period when efforts to reduce deer density were underway. The second project, also completed during 1996, involved a four year investigation of the mortality and dynamics of a Jasper County deer population. Information from this study will lead to a better understanding of deer in the lower coastal plain. An investigation of the biology and condition of deer at Sea Pines on Hilton Head Island entered its second and final year. This study is the first urban deer study the Wildlife Management Section has been involved in and it may provide information relative to future conflicts between deer and humans in urban settings. The fourth cooperative study in 1996 involved a complete analysis of the statewide deer harvest records from 1987-1994. This analysis will provide basic temporal and spatial condition information, temporal and spatial interpretations of sex and age structure, as well as, the application of current mathematical models to South Carolina's deer harvest data. A one year study of the deer population in the mountains of South Carolina was initiated and completed during 1996. This study involved the collection and analysis of base line biological data from animals in the region. The final study involving deer in 1996 sought to determine the feasibility of utilizing a random postal survey as an alternative to big game check stations for the gathering of deer harvest figures in the piedmont of the state. Based on preliminary findings, the requirement that piedmont deer hunters take harvested deer to check stations was removed. This study will be completed in 1997.

Wild Turkey Project

The objectives of the Wild Turkey Project are to produce and maintain a healthy and dynamic wild turkey population, and to evaluate and restock as many qualified wild turkey restoration sites as possible annually, in order to establish a viable or huntable population in every county.

Six new sites in 6 different counties were stocked with 95 turkeys. Another 87 turkeys were sent to North Carolina, 139 to Texas, and 32 to Delaware to assist in their restoration efforts. A total of 196 sites have been stocked in South Carolina with 3,380 birds since 1976.

The summer turkey survey provides information on reproductive trends and success of restoration. During the summer of 1996, 1,564 observations resulted in the sighting of 13,299 turkeys. Overall observations decreased with the poult to hen ratio of 3.7 decreasing slightly from the previous year indicating fair to good reproduction last summer.

No fall season was held in 1996. The 1997 spring season resulted in 13,984 birds checked and 39,459 sets of tags issued. A portion of all 46 counties now have an open spring gobbler season.

Four National Wild Turkey Federation (NWTF) fund raising banquets, 4 board of director meetings, and the Technical Committee meeting were attended. The Southeast Wild Turkey Committee meeting was hosted by the SCDNR this year and held at the Webb Wildlife Center. At least 66 NWTF Super Fund projects were reviewed and funded. Total Super Fund expenditures for projects to benefit turkeys were in excess of \$143,000 in 1996-97.

Statewide Alligator Project

The objective of the alligator project is to promote and maintain a healthy and safe alligator population, and to protect and manage the alligator resource by and monitoring alligator population trends. Primary responsibilities of the project include the administration of the Alligator Control Program, the issuance of marketing permits to and the inspection of establishments that sell alligator products, the execution of night spotlight surveys to determine population trends, and to conduct research to gain a better understanding of the alligator resource.

During the reporting period, 750 nuisance alligator complaints were received and about 250 alligators were captured and processed. Three alligator hide sales were conducted generating \$69,171 in sales, the state retained \$5,188. Sixty-five (65) businesses were permitted to market alligator products; generating \$2,275.00 in state revenue. Fourteen (14) night spotlight surveys were conducted on sample areas to provide an index of the alligator population. The 1996 Private Lands Harvest Program was implemented. A total of 177 tags were issued and 128 alligators were harvested from 11 properties. Over 880 feet of hides and more than 1 1/2 tons of alligator meat was produced during the season. The program generated \$6,695 in state revenue.

Dissemination of information to the public was tremendous. The project supervisor completed 10 television interviews, 15 newspaper and magazine interviews, 9 radio interviews, 1 book interview, and completed 2 news releases. Additionally, 19 public talks were given to 1,269 people.

The third year of a long-term research project examining temperature-dependent sex determination in alligator hatchlings was completed. A paper entitled "ALLIGATOR NEST TEMPERATURES AND HATCHLINGS SEX RATIOS IN COASTAL SOUTH CAROLINA" was completed by the project supervisor and presented at the 50th Southeastern Association of Fish and Wildlife Conference in Hot Springs, AK. A paper entitled "GROWTH RATES OF AMERICAN ALLIGATORS IN COASTAL SOUTH CAROLINA" was completed by the project supervisor and was accepted and printed in the JOURNAL OF WILDLIFE MANAGEMENT. Lastly, a book chapter titled "THE HEALTH OF ALLIGATOR POPULATIONS IN SOUTH CAROLINA" was completed. The chapter will be in a book entitled "PRINCIPLES AND PROCESSES FOR EVALUATING ENDOCRINE DISRUPTION IN WILDLIFE."

Small Game Project

The objective of the Small Game Project is to monitor and manage the small game resources of the state for the well being of small game populations and for the benefit of the public, and to effectively manage small game populations through technical assistance, research and surveys, education and liaison with other state and federal agencies and private conservation organizations.

Regional wildlife biologists were assisted with small game habitat development on Wildlife Management Area (WMA) lands. Ongoing projects at Webb Wildlife Center in Hampton County (5,800 acres), Fact's Grove WMA in Anderson County (8,000 acres), Cracker neck WMA in Aiken County (4,700 acres), Santee Cooper WMA in Orangeburg County (2,800 acres), Sand Hills State Forest WMA in Chesterfield County (46,000 acres), Manchester State Forest WMA in Sumter County (29,000 acres), Canal WMA in Berkeley County, U.S. Forest Service lands in Union County, McBee WMA in Chesterfield County (780 acres), and on U.S. Army Corps of Engineers land in McCormick County (1,200 acres) were continued.

The S.C. Forestry Commission and the S.C. Department of Parks, Recreation and Tourism continue to be assisted with development of a multi-purpose dog-trailing and recreation area on Sand Hills State Forest. The H. Cooper Black, Jr. Memorial Field Trial and Recreation Area encompasses approximately 7,500 acres and will serve the needs of many S.C. citizens.

The South Carolina Forestry Commission was contracted to grow shrub lespedeza seedlings, which are then provided to the public. One million seedlings were available for distribution, with 916,000 being sold to the general public and the remainder utilized on WMA lands.

Eighty public and private shooting preserve operations were licensed. Revenue received from license fees was \$59,350. Five preserves and commercial quail breeders were inspected and/or provided with technical assistance.

Two overnight seminars on bobwhite quail management were conducted, attended by 53 landowners or managers controlling considerable acreage of potential quail habitat.

Thirty-four counties participated in the 4-H Food and Cover Establishment (F.A.C.E.) for Wildlife Program, with 134 food plots entered in the contest. Thirty-one counties were enrolled in the

F.A.C.E. Program for the coming year.

The Bobwhite Quail Whistling Cock Survey was conducted for the 18th consecutive year and the Quail Hunter Survey was conducted for the 10th year. An annual survey of hunting success by rabbit hunters was conducted for the 6th consecutive year, and a summer Quail Brood Survey was conducted in conjunction with the Wild Turkey Brood Survey for the 4th year. The U.S. Fish and Wildlife Service S.C. Cooperative Research Unit was assisted with continuation of a mourning dove research project in Marlboro and Orangeburg Counties. Project staff directly assisted with banding of doves on the Marlboro County study sites. A research project to evaluate impacts of various thinning levels within Conservation Reserve Program pine plantations was initiated in conjunction with Clemson University, the University of Georgia and The National Wild Turkey Federation.

Six Quail Unlimited (QU) meetings and fund raisers were attended and cooperative projects for habitat improvement and education developed. Joint SCDNR-QU projects involved \$7,730 QU dollars.

The project supervisor served on the State Conservation Review Group of the USDA Farm Service Agency, and the State Technical Committee of the Natural Resources Conservation Service, which are responsible for reviewing and recommending changes in regulations governing various federal agricultural programs such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), the Wetland Reserve Program (WRP), as well as the new Wildlife Habitat Incentives Program (WHIP). Each of these incentive programs has potential beneficial as well as detrimental impacts on wildlife.

One hundred eighty-six small game field trial permits, 2 depredation permits and 20 quail recall pen and quail translocation permits were issued. Also, 12 bird dog training licenses were issued and 4 rabbit enclosures approved.

Program efficiency is monitored through accomplishments. The technical assistance program resulted in habitat management plans for 1,336 acres per landowner visited. Shooting preserve revenue generated was \$742 per operation licensed. Cooperative projects with Quail Unlimited (QU) resulted in expenditure of \$859 QU dollars per local QU Chapter.

Waterfowl and Wetlands Management Projects

A total of 21,127 wetland acres on these Department owned and managed Project properties were intensively managed utilizing state-of-the-science techniques to provide quality production and wintering habitat for local and migratory waterfowl as well as a wide variety of other wetland dependent wildlife species. These tracts represent approximately 29.7% of the total managed tidal wetlands in South Carolina.

The annual midwinter index for South Carolina was coordinated; trend estimates from this survey indicated a total concentration of 83,988 ducks (-55.9% from 1996) were observed in South Carolina in 1997; the 1997 midwinter estimate of ducks was -52.1% from the 10-year average, 1988-97. The 1997 survey represented 5.1% of the estimated Atlantic Flyway population of ducks (-44.6% from 1996). An estimated 7.4 % of the Atlantic Flyway dabbling ducks were enumerated in South Carolina (-6.7% from 1996); the number of dabbling ducks was -62.7% from the 10-year average, 1988-97.

Utilizing waterfowl estimates from the 1997 midwinter waterfowl index, 14,443 ducks were enumerated on these projects, -70.6% as compared to 1996; this number represented 22.5% of the ducks enumerated on coastal managed wetlands (-62.2% from 1996) and 17.2% of the total ducks enumerated in South Carolina (-33.3% from 1996).

Project personnel represented South Carolina on the Atlantic Waterfowl Council Technical Committee and actively served on various constituent committees including the harvest management, wood duck and mallard committees. The waterfowl project leader serves on the International ad hoc committees to evaluate the Flyway Council System and evaluate the regulatory process.

Project and agency efforts have been substantial toward a coordinated interagency endeavor known as the North American Waterfowl Management Plan, the focus of continental waterfowl population management and wetland enhancement and protection. Bear Island and Donnelly WMAs are the premiere projects in the ACE Basin Focus Area. Santee Coastal Reserve and Santee-Delta WMA are the premiere projects of the Santee River Focus Area. Samworth WMA is the premiere project of the Winyah Bay Focus Area. A \$400,000 grant under the North American Wetlands Conservation Act was completed acquiring and enhancing 328 acres of prime coastal wetlands adjacent to Samworth WMA. All focus area initiatives are components of the Atlantic Coast Joint Venture of the North American Waterfowl Management Plan.

Samworth and Santee-Delta Wildlife Management Areas

The objectives of Samworth and Santee-Delta Wildlife Management Areas are to employ multiple use management considerations to provide the highest quality wetland habitat possible to meet the needs of wintering local and migratory waterfowl as well as production habitat for local waterfowl; to provide high quality habitat for a variety of other wetland dependent game, nongame, and endangered species; to provide high quality recreational public fishing and hunting opportunities for waterfowl and mourning dove; to provide showcase areas for education and demonstration of state-of-the-science wildlife management principles and techniques; to provide research facilities for advancement of waterfowl and wetlands management; and to provide accessible interpretive natural areas for appreciative resource use and nature study. These objectives are met by conducting professional wildlife management programs on Samworth (1,588 acres) and Santee-Delta (1,870 acres) Wildlife Management Areas. These areas are located respectively in upper Georgetown County between the Waccamaw and Big Pee Dee rivers and in lower Georgetown County between the North and South Santee rivers.

Through water level manipulation, a total of 2,101 acres on these areas were managed intensively to produce annual crops of naturally occurring, seed producing, herbaceous plants favored as food sources by waterfowl.

During the 1996-97 waterfowl hunting season on Samworth WMA, 138 hunters were selected to hunt and harvested 129 ducks (0.90 ducks per hunter). Perimeter waterfowl hunting adjacent to Samworth WMA was estimated at a minimum of 1,097 man days effort during 1996-97 (no change from 1995-96 and -8.4% compared to the 14-year average). Total minimum man days of waterfowl hunting opportunities available at Samworth WMA in 1996-97 were 1,235 (+1.6% from 1995-96) representing 51.9% of the total man days of waterfowl hunting available on all Department waterfowl projects.

During the 1996-97 waterfowl hunting season on Santee-Delta WMA, 141 hunters were selected to hunt and harvested 438 ducks (3.10 ducks per hunter). A total of 11 public dove shoots were conducted at Samworth WMA during 1996-97.

Waterfowl and Wetlands Landowner Technical Assistance

A total of 60 requests for technical guidance/information were received during 1996-97. All requestors were provided appropriate information and various handouts summarizing applicable wetland management techniques and steps to positively influence resource use and recreational availability. Of these, 25 required field investigations and written recommendations/management plans were provided to 9 landowners.

Winyah Bay Focus Area

Under the guidelines of the North American Waterfowl Management Plan Atlantic Coast Joint Venture, a broad based habitat protection and enhancement strategy known as the Winyah Bay Focus Area, initiated in 1991-92, was continued. This program continues to identify, categorize and seek various levels of natural resource protection on key tracts within the confines of the lower Winyah Bay drainage system. A Task Force coordinated and directed Focus Area initiatives. Task Force members include Brookgreen Gardens, Ducks Unlimited, Historic Ricefields

Association, International Paper Company, South Carolina Waterfowl Association, South Carolina Department of Natural Resources, U.S. Fish and Wildlife Service, and private landowners. A number of Task Force and working meetings were conducted to refine objectives, work with private landowners, assemble a natural resource inventory for the Focus Area, and communicate goals and accomplishments.

The Winyah Bay Focus Area comprises some 360,000 acres; 270,00 acres of the project total is tidally influenced wetlands, river swamp or open water. The largest contiguous block of intertidal freshwater wetlands in South Carolina occurs in the project boundary. Acre-for-acre the most valuable waterfowl habitat in South Carolina and the highest concentration of recreational waterfowl hunting in South Carolina occurs in the Winyah Bay Focus Area. Only a small portion (55,262 acres) of the wildlife habitat in the Winyah Bay Focus Area core are protected by agency ownership or conservation easements; this represents only 15.4% of the high priority project acreage.

Specific accomplishments completed in the 1996-97 include the recording of private land conservation easements on Springfield, Chicora Wood and Rosebank plantations. Completion of an Environmental Impact Statement continuing documentation on the proposed Waccamaw National Wildlife Refuge and a finding for the fact by the Regional Director of the US Fish and Wildlife Service. SC DOT acquired an additional 16,800 acres dedicated to conservation as mitigation banking; this acreage includes Sandy Island Nature Preserve.

Statewide Wood Duck Nest Box Project

The objective of the Statewide Wood Duck Nest Box Project is to construct and provide wood duck nest box units to cooperating landowners to enhance wood duck breeding populations in South Carolina by augmenting productivity from naturally occurring tree cavities. Secondly, landowner involvement in wildlife conservation and management programs fosters educational opportunities for cooperators and their families.

A total of 286 applications from prospective cooperators were received and evaluated for inclusion into this project. During 1996-97, approximately 1,500 nest boxes were constructed and 1,291 nest box units were distributed to 161 new cooperating landowners. Through the 16th year of this project, 2,985 cooperators have received 22,430 nest box units.

After the 1996 wood duck nesting season, 808 of 2,011 active cooperators (40.2% active and 28.6% total) provided data on 5,203 units (24.6% of the total number of allocated units). This represented a decrease (10.6%) in reporting by total cooperators from 1995 and an increase (9.2%) of reporting by active cooperators. A total of 744 (92.1%) of the reporting cooperators performed preseason nest box maintenance. A total of 3,637 nest boxes (69.9% of the available) were utilized by wood ducks, representing an increase of 10.4% from 1995. A total of 3,069 nests were reported to be successful (84.4%) producing a reported 30,405 wood ducklings from 46,809 eggs laid. This represents increases in successful nesting (+6.9%), total eggs produced (+9.9%) and wood ducklings fledged (+10.6%) from 1995.

Forest Stewardship Program

The purpose of the Forest Stewardship Program is to assist and encourage non-industrial private landowners in actively managing natural resources on their property. The South Carolina Forestry Commission administers the program and other natural resource management agencies, such as South Carolina Department of Natural Resources and U.S.D.A. Natural Resources Conservation Service, provide input in their particular area of expertise.

In October, 1991, the South Carolina Department of Natural Resources officially began participating in the stewardship program. In September, 1993, Judy Barnes, a wildlife biologist, was hired full time to assist regional biologists with this program. She is responsible for the entire state. Responsibilities include site inspections, written wildlife recommendations according to landowner's objective for that particular site, development of specifications for practices that

benefit wildlife through habitat enhancement, needs and compliance checks regarding those practices under the Stewardship Incentive Program (SIP), and presentations of the stewardship program upon request. Landowners who exemplify a stewardship ethic in the management of their forest and related resources can be nominated to have their property certified as a Stewardship Forest. The stewardship biologist participates, with other natural resource professionals, in the inspection of such properties. Approximately 50 landowners have received recognition as good stewards of the land. During fiscal year 1996-1997, wildlife management section personnel reviewed 11 plans, visited 83 sites, were principal authors/coauthors on 56 plans, conducted 35 needs checks and 42 compliance checks for a total of 177.56 person days.

The stewardship biologist also serves on committees such as: Forest Stewardship Incentive Program Funding Committee for the Camden, Sumter, Lexington, Orangeburg and Walterboro Areas; Forest Stewardship Coordinating Committee's SIP Policy and Procedure Subcommittee; South Carolina Red-cockade Woodpecker Conservation Coalition; South Carolina Tree Farm Committee and Clemson University Alumni Association (Forestry). Programs on forest stewardship, forestry, wildlife and the Becoming an Outdoors-Woman Program were presented to approximately 360 participants during the past year.

FRESHWATER FISHERIES SECTION

The Freshwater Fisheries Section is organized, equipped and staffed to provide the sportsmen and citizens of South Carolina with those services required to protect, conserve, and enhance the state's freshwater fishery resources.

The Fisheries Section's organizational structure includes eight fishery districts that provide local attention to every county in the state. Operations incorporate seven fish hatcheries that are used to produce and stock those species necessary to replenish and enhance natural fish populations. The Section also operates a research station near Eastover which conducts research in areas of state-wide interest and provides technical assistance to the fishery districts. Additionally the agency provides fifteen public fishing impoundments across the state totaling 1,390 acres water.

District Operations

Survey and inventory activities were conducted to assess the status of fish populations in 35 lakes and reservoirs and in 24 rivers and streams. A summary of these activities is presented in Table 1. In cooperation with the Law Enforcement and Boating Division trout stocking of the Lower Saluda River by helicopter was continued.

A summary of technical assistance activities is presented in Table 2. Activities relating to fish habitat development and angler access improvements are summarized in Table 3.

Fish Hatcheries

Sterile Grass Carp Program - During FY97 195,465 sterile grass carp were shipped into South Carolina for stocking in public and private waters. Ploidy was tested on 3,563 individuals. On two occasions diploid grass carp were detected and those respective shipments were rejected and returned to the vendor.

Fish Hatchery Operations and Production - The Department's seven freshwater hatcheries produced a total of 8,911,665 fish during FY97. Production by species is presented in Table 4. Hybrid and striped bass stocking records are presented in Table 5.

State Lakes Maintenance

The Freshwater Fisheries Section manages and maintains fifteen public fishing lakes. Maintenance of these facilities includes construction and repair of support facilities, boating access, aquatic weed control, lake fertilization, and maintenance of grounds and signage.

A new boat ramp and courtesy pier was constructed at Lake Wallace and a parking area was constructed at Mountain Lakes.

Table 1. Sampling Techniques by Water Body, FY 97.

LAKES AND RESERVOIRS	SAMPLING TECHNIQUE											Other (Specify)
	Rotenone	Electrofishing	Gill Nets	Trap Nets	Hoop Nets	Creel Survey	Trawl or Meter Net	Seine	Water Quality	Hook & Line	Macro Invertebrate	
Andrew Jackson State Park		X										
Broadway Lake		X										
Dragon's Pond		X										
Fishing Creek Reservoir		X										
Four Holes Swamp												
Jonesville Reservoir		X										
Lake Ashwood		X										
Lake Blalock		X										
Lake Bowen		X				X		X				
Lake Brown	X											
Lake Cherokee		X										
Lake Greenwood		X		X								
Lake Hartwell		X	X									
Lake Jocassee			X			X			X			
Lake Keowee						X						
Lake Long		X										
Lake Marion		X	X					X	X			a, b

LAKES AND RESERVOIRS	Rotenone	Electrofishing	Gill Nets	Trap Nets	Hoop Nets	Creel Survey	Trawl or Meter Net	Seine	Water Quality	Hook & Line	Macro Invertebrate	Other (Specify)
Lake Monticello		X		X		X	X		X			
Lake Moultrie		X	X					X	X			
Lake Murray	X ^c	X										
Lake Oliphant		X										
Lake Rabon		X		X								
Lake Robinson		X										
Lake Russell				X		X						
Lake Seccession		X										
Lake Thicketty		X										
Lake Thurmond		X		X		X						
Lake Wateree		X						X				
Lake Welchel		X										
Lake Wylie		X										
Monticello Subimpoundment		X										
Mountain Lakes		X										
Parson's Mountain		X										
Star Fort Pond		X						X				
Stevens Creek Reservoir		X										

RIVERS AND STREAMS	Rotenone	Electrofishing	Gill Nets	Trap Nets	Hoop Nets	Creel Survey	Trawl or Meter Net	Seine	Water Quality	Hook & Line	Macro Invertebrate	Other (Specify)
Ashepoo River		X										
Black River		X										
Broad River		X										
Catawba River		X			X				X			
Chatooga River		X				X						
Chauga River												
Combahee River		X										
Cooper river		X										
East Fork River		X										
Eastatoe River		X										
Edisto River		X				X		X				
Great Pee Dee river		X							X			
Middle Saluda River		X				X						
Lower Saluda River		X	X		X	X			X		X	
Santee River		X										b
Tributaries of Saluda/Congaree in Lexington & Richland Counties	X								X			
Tributaries to the Savannah River in Abbeville County		X							X		X	

White Water River		X				X						
LAKES AND RESERVOIRS	Rotenone	Electrofishing	Gill Nets	Trap Nets	Hoop Nets	Creel Survey	Trawl or Meter Net	Seine	Water Quality	Hook & Line	Macro Invertebrate	Other (Specify)
Lynches River						X						
Cedar Creek/ Congaree Tributary		X						X				
Little Pee Dee River		X										
Reedy River		X										
Congaree River		X										
Wateree River		X										

a) Mesocosms

b) Plankton netting

c) Littoral/zone rotenones

Table 2 Technical Assistance Activities by Area, FY97

PROJECT	POND MANAGEMENT								Env. Permits	Fish Kill Investigations	
	Pond Balance Checks	General Pond Mgt. (Fertilizat'n etc.)	Aquatic Vegetat'n Control	Pond Stocking	Parasites and Diseases	Other	Total Number of Ponds Checks	Total Acreage Checked	Total Number of Permits Reviewed	Number of Public Water Fish Kills	Number of Private Water Fish Kills
District I	45	35	34	9	4	2	60	425	0	2	5
District II	42	9	8	0	0	0	56	214	0	1	3
District III	28	14	18	0	3	5	44	119	8	0	6
District IV	70	110	88	0	0	0	153	414	7	0	8
District V	65	8	54	50	8	3	127	200	1	2	14
District VI	89	13	93	10	0	0	149	1185	12	0	7
District VII	12	29	38	0	5	16	100	310	8	6	18
District VIII	41	51	91	27	8	7	113	518	1	0	13
Eastover	0	50	0	0	0	2	42	177	0	0	0
Coordinat'n	0	0	0	0	0	0	0	0	0	0	0
Totals	392	319	424	46	20	32	844	3562	37	11	74

*An additional 684 pond management assistance contacts made by phone.

Table 3 Report of Development Activities by Activity Type and Area, FY97

PROJECT	Fish Habitat Development					Angler Access Improvements				Other
	Fish Concentration Areas		Water Level Drawdown	Instream Structures		Angler Access Trails	Fish Feeders		Anglers Mooring Areas	
	Number of Fish Attractors Maintained	Acre feet of Habitat Created	Number of Water Bodies Drawn Dwn	Number of Structures Maintained	Feet of Stream Habitat Improved	Miles of Trails Maintained	Number of Feeders Maintained	Ponds of Feed Used	Number of Devices Installed	
District I	28	2.0	0	30	400	0	4	600	4	b
District II	36	0.61	0	0	0	1.0	0	0	0	
District III	43	0.51	0	0	0	.67	2	350	0	a
District IV	52	2.13	0	0	0	4.04	3	5,000	0	
District V	15	.43	0	0	0	0	0	0	0	
District VI	4	0.09	0	0	0	10	0	0	0	
District VII	0	0	0	0	0	0	2	2,000	0	
District VIII	0	0	0	0	0	0	2	250	0	
Eastover	0	0	0	0	0	0	0	0	0	
Coordinat'n			0	0	0	0	0	0	0	
Total	178	5.34	0	30	400	15.71	13	8,200	4	

a) Seven oak trees planted at Star Fort Pond; assist with planting of 1000 cypress and 500 Buffoon bush on Lake Murray; 2.67 acres and 0.36 acres annual rye grass planted on Lakes Murray and Greenwood respectively.

b) Area layout for new instream structure.

Table 4. Hatchery production by species, FY97.

Species	Total Production
Largemouth Bass	871,417
Smallmouth Bass	27,543
Bluegill	2,334,288
Redear	622,233
Channel Catfish	101,857
Blue Catfish	25,855
Striped Bass	3,250,536
Striped BassXWhite Bass Hybrid	604,479
Trout	1,073,457

Table 5. Striped bass and hybrid stocking records for FY97.

Stocking Location	Species	Number Stocked
Lake Thurmond	Hybrid (original)	336,089
Lake Hartwell	Hybrid (original)	276,723
Lake Moultrie	Striped Bass	1,386,937
Lake Murray	Striped Bass	864,678
Lake Wateree	Striped Bass	241,340
Lake Greenwood	Striped Bass	320,434
Santee River	Striped Bass	1,111,166
Cooper River	Striped Bass	825,509

Rediversion Project

The Rediversion Project is funded by the U. S. Army Corp of Engineers. The efforts of the project are directed toward mitigating the impacts of the Cooper River Rediversion Project on anadromous fish populations in the Santee-Cooper system.

Approximately 458,000 fish were passed at the St. Stephen's fish lift and an additional 153,000 pounds of fish (510,000 herring units) were passed in to the system at the Pinopolis lock. During the fish lift season the St. Stephen's facility was toured by over 5,600 visitors. Agency personnel continued to work with USACOE staff to complete a \$5.8 million modification to improve lift efficiency and effectiveness. Work was continued to evaluate the shortnose sturgeon population that utilizes the rediversion canal and fish lift.

Wateree-Congaree Research Station - Eastover

Genetic evaluations of trophy largemouth bass (>7 lbs.) from lakes Murray and Moultrie were continued. Analysis of first year growth in two strains of largemouth bass stocked in Piedmont and Coastal Plain was continued. Pond water quality was monitored. Genetic analysis of fingerlings is underway to assess shifts in allele frequency for each pond population relative to initial frequencies. Genetic evaluation of striped bass populations in the Great Pee Dee and Santee rivers and in the ACE basin continued.

Results of allozyme analysis for redeye bass were collected from the Chattooga, Chauga and Saluda rivers, Stevens and Generostee creeks and Lake Jocassee were received and are being compared and interpreted. Genetic evaluation of bluegill populations in seven reservoirs and rivers was initiated.

Larval striped bass survival and growth rates were measured from groups of larvae stocked into a series of mesocosms stationed in the head waters of Lake Marion. The mesocosms were

managed to simulate various levels of productivity. These data will be used to fine tune the individual-based model for striped bass of the Santee-Cooper system.

Assistance was provided to Fishery Districts II, III, VI and VII in age and growth evaluations flathead catfish. Project personnel coordinated the Sections involvement in the recovery assessment of the Reedy River following a major oil spill.

WILDLIFE DIVERSITY SECTION

The mission of the Wildlife Diversity Section is to maintain all of South Carolina's native plants and animals in their natural habitats and preserve the archaeological record on the land. As reported below, this mission is accomplished through the major program areas of: Research and Survey, Preserve Management, Education and Public Relations, Wildlife Assistance, Technical Guidance and Major Publications.

RESEARCH AND SURVEY

Bat Population Survey of Leesburg Training Site, Fort Jackson---The abandoned tunnels on the site, which are important roosts for bats including the state endangered big-eared bat (*Corynorhinus rafinesquii*) were modified. The 3 most stable and least disturbed of the 6 tunnels were selected for modifications. Horizontal and vertical baffles were built in the tunnels to reduce wind and thereby stabilize temperatures in addition to capping many of the openings on the tops of the tunnels. Temperature loggers were used to record conditions within all of the tunnels. Early indications are that temperatures in the modified tunnels do not fluctuate as dramatically as in the unmodified tunnels.

Big-Eared Bat Survey---In the mountain region, 29 sites were surveyed with 190 trap nights, which resulted in the capture of 3 big-eared bats. In the piedmont region, after 89 trap nights at 7 sites, no big-eared bats were captured.

Two big-eared bats were captured and radio-tagged--a male at a known roost on Diane Mountain and a lactating female in a hardwood cove at Oconee State Park. The male was captured shortly before a cold front moved in and could not be relocated locally--the roost having been abandoned. The female was tracked to a roost at which several other big-eared bats were observed.

Bat Survey and Wood rat and New England Cottontail Surveys---In the upper piedmont and mountain regions, 886 trap nights were conducted at 12 different sites to determine the distribution of 2 rare terrestrial species--Wood rats and New England cottontails. Three of the sites were 'follow-up' locations to detect if any changes had occurred since they had been previously trapped and the other 9 were new sites. Wood rats were captured in all except 1 follow-up site and 3 new sites. New England cottontails were captured in 1 of the follow-up sites and 3 new sites.

Bats were sampled in the non-hibernating months to monitor their status in the upper piedmont and mountain regions. A total of 32 trap nights at 8 sample sites resulted in trap success of 9.3%. All locations had previously been sampled.

Piedmont Vertebrate Survey---The on-going cooperative effort between SCDNR and the Museum of York County (MYC) to determine vertebrate species diversity and distribution in the upper piedmont was continued with an intensive survey of a site at Brattensville, which included 3,600 trap nights and yielded 17 species. One of the most noteworthy finds was *Hyla cinerea*, the green treefrog, which was a range extension discovery for that species.

Duke Energy Hydroelectric Plant Surveys---In cooperation with Duke Energy (formerly Duke Power Company), the pilot program started last year to enable hydroelectric plant operators to assist in determining wildlife use around 3 hydro stations was continued. The data collected from DPC plant operators has provided information about vertebrate and other species, especially

birds. This confirms the expected effects of hydro stations concentrating cormorants, sea gulls, osprey and wading birds. Since most sites have public access, the data will be disseminated through various media to encourage visitation during times of peak bird abundance.

Duke Energy Land Survey---The survey of Duke Energy land holdings along the Catawba River was completed. Important wildlife and natural areas were identified, denoted on maps and presented at two joint meetings of SCDNR and Duke Energy. The most significant wildlife areas included: areas below hydro stations, river and lake islands, marshy wetlands and populations of the rocky shoals spider lily.

Champion International Natural Lands Survey---Champion manages more than 235,000 acres in South Carolina, with 80% primarily for pine pulp production. The remaining 47,000 acres were surveyed for identification of rare, threatened or endangered species as well as important natural areas. Thirty-one elements considered significant under the Heritage Trust Program were discovered and will be incorporated into the Heritage Trust database. In addition, this information will be used not only as an aid in conducting a county-wide survey for Lancaster County but also to develop conservation strategies for Champion International.

Raptor Survey at Leesburg National Guard Training Site, Fort Jackson---This one-year project, to determine an annual status of diurnal and nocturnal raptor species at the Leesburg Training Site (LTS), consists of conducting; weekly surveys for diurnal raptors; monthly surveys for nocturnal raptors; and raptor nest searches during early spring. These surveys resulted in the documentation of 8 species of diurnal raptors (excluding vultures). The Red-tailed Hawk was by far the most common species with total numbers increasing slightly during the winter months. Three species of nocturnal raptors were also documented with the Screech Owl being the most common. Total numbers for all owl species showed notable increases during the late fall and early winter.

Raptor densities were low at LTS compared to the nearby Lower Richland survey route and no active nests were found. This may be attributed to a diverse mix of agriculture, woodlots, old field and pasture which makes up that survey route, and probably results in a higher prey base, as opposed to LTS, which has few openings or fields and little ground cover or understory.

Migratory Landbird Surveys---The initial point counts were conducted at Lewis Ocean Bay HP (LOB), Cartwheel Bay HP (CWB) and Great PeeDee HP (GPD) to determine baseline inventories and status of high-ranked landbirds. In addition, 5 of the 22 Breeding Bird Survey routes in South Carolina were used for counts. GPD had the highest number birds per point count--13.2, followed by CWB--12.5 and LOB--9.2. The number of neotropical migratory bird species, compared to the total number of permanent resident species, was slightly over 50% for all of the Heritage Preserves.

Significantly, except for American Crows at LOB, avian predators and parasites of migratory birds were not considered prevalent at the preserves. A detailed report on the surveys will include management implications for these preserves to enhance potential habitats for the 7 high-ranked neotropical migratory breeding species found.

Swallow-tailed Kite Survey---This survey was conducted primarily at Francis Marion National Forest (FMNF) to determine an annual status, including recovery from Hurricane Hugo, as well as document status in other coastal areas. A total of 38 kites were located at 25 sampling sites at FMNF. Based on 4 years of pre-Hugo data collection compared to 4 years of post-Hugo data collection, Swallow-tailed Kite numbers at FMNF are estimated to have declined by 22%. The elimination of tall stands of loblolly pine nesting habitat by the hurricane are judged to be the primary reason for this decline.

Although FMNF has the northern-most nesting population of this species, there has been an increase in sightings north of FMNF (Georgetown, Williamsburg, Marion and Horry counties) as well as other coastal locations, such as the lower Edisto River-ACE Basin area, Charleston county

and the lower Savannah River Swamp.

Monitoring Avian Productivity And Survival (MAPS) Program---In the seventh year of this constant-effort, nationwide bird-banding program, 19 different species were banded at the Congaree Swamp National Monument (CSNM), including thirteen neotropical migrants. The total capture effort in 1997 resulted in 15.7 birds per 100 net-hours. This is above the five-year average of 15.2 birds and well above the 1996 figure of 9.9 birds per 100 net-hours. Results were submitted to the National Study coordinator for data storage and analysis.

Migratory Shorebird Survey---A total of 102 man-days were utilized to record data on species type, abundance and general behavior at various coastal locations in Cape Romain National Wildlife Refuge (NWR) as well as managed wetland areas within Santee Coastal Reserve and Tom Yawkey Wildlife Center. Overall, 79,926 shorebirds representing 22 shorebird species were documented using high-tide roosts within the Cape Romain NWR study area. At the Santee Coastal Reserve site, 1,060 shorebirds representing 13 species were counted and 20,093 shorebirds representing 20 species were observed at the Tom Yawkey Wildlife Center.

Seabird and Shorebird Nesting Survey---Fifty-five coastal sites were surveyed for nesting seabirds and shorebirds with a total of 123 man-days. At each site, a total ground count of all nests was conducted, with the exception of *Larus atricilla*, Laughing Gull, which was not including in the census this year. Also, surveys of Wilson's Plover and American Oystercatcher were confined to northern coastal sites.

Seabird and shorebird nesting efforts this year showed an increase over the 1996 survey, with the exception of Black Skimmers and Sandwich Terns, which decreased slightly. For most species, 1997 represents the first nesting increase since 1993.

Piping Plover Survey and Census---Winter surveys continued for this critically endangered species, with 1997 being the first year that the entire coastal habitat area was surveyed, regardless of historical activity. A total of 103 piping plovers at 16 sites were documented, with the highest concentration in Charleston County. Based on data collected for the past 5 winters, the nonbreeding population in South Carolina appears to be stable or slightly increasing; however this may be due to increased survey efforts as 10.7% of the birds observed this year were located in areas not previously surveyed. Data was supplied to USFWS (among others) to use in accessing the potential impact of beach development at Waites Island.

Bald Eagle Monitoring---The bald eagle nest near Lake Russell was monitored both aerially and from the ground to determine nesting success. Two adults were seen in the nest but successful reproduction could not be confirmed.

Bald eagle nesting activity was monitored during 9 aerial surveys. A total of 135 eaglets were produced from 114 occupied territories. These numbers represent continued high productivity with more than half of the 1,335 chicks fledged, during the 21-year monitoring period, in the past 6 years. Overall, adult mortality rates have remained higher than expected, averaging 14% per year.

The Midwinter Bald Eagle Survey documented 373 bald eagles, which is an increase over last year's survey when 346 were counted.

Manatee Survey And Monitoring---A total of 92 manatees were reported during FY 1996-97 with sighting concentrated, as usual, from June to September. Reports were made by fishermen of 2 dead manatee at different locations but neither carcass was found. In addition, SC DNR personnel assisted in monitoring 2 female manatees radio-instrumented by Georgia DNR.

Sea Turtle Research And Surveys---Eleven Aerial Beach Surveys, flown to document loggerhead sea turtle nesting efforts, resulted in an estimate of 2,169 loggerhead turtle nests representing 529 nesting females. These numbers are below, but still within, the annual variation observed previously. However, the three-year average from 1995/96/97 is a 26% decline compared to the prior three-year average.

Pelagic Aerial Surveys for Leatherback Turtles--Six aerial surveys were conducted at 1.5 and 3.0 miles offshore to document the distribution of leatherback turtles during their spring migration. These surveys are part of a federal Contingency Program with Florida and Georgia. Far fewer leatherbacks were seen this spring in South Carolina as well as Florida and Georgia and the major part of the migration may have been farther offshore for unknown reasons.

Colonial Wading Bird Survey And Census---A great blue heron nesting site on Lake Hartwell was visited after observations last year indicated probably nesting activity and evidence of recent nesting was found. This site represents the furthest inland great blue heronry in South Carolina.

The Statewide Survey and Census of Wading Bird Nesting Populations resulted in confirmed nesting activity at 120 colonies out of 151 known sites. In addition, 13 new nesting sites were located during aerial surveys.

Six surveys of 8 wetland areas for a grant project for Managing Coastal Wetlands for Increased Biological Diversity were completed. Four of the surveyed wetlands were under traditional water management (maximizing plant species considered valuable forage for wintering waterfowl) and 4 were under an integrated waterbird management plan (providing forage for shorebirds and wading birds in addition to waterfowl). Early results of the surveys suggest a higher species richness and total abundance of waterbirds in the latter wetland areas.

Wood Stork Survey---Air and ground surveys of 184 recently active water bird colonies were made to check for the presence of nesting storks. A total of 8 active nesting sites with 917 nests were located, a slight decline from 7 active nesting sites with 953 nests in 1996. This year's sites include 2 new colony sites, which extend the nesting range for the species further north. An estimated total of 1,480 stork chicks fledged.

Least Tern Survey---A comprehensive statewide survey was done of all sites known to have been used by nesting birds in the past 5 years. Twenty-two ground and 17 roof nesting colonies were counted, containing 1,549 nests. Based on data from previous surveys (1989-1995), the nesting population seems to have stabilized at 1,500 nests. However, the small size of ground colonies is a cause for concern as chick counts have been consistently lower.

Longleaf Pine Project---Gopher Frog and Flatwoods Salamander Surveys were conducted at night during 13 visits to 3 historic breeding ponds. Although no gopher frogs or flatwoods salamanders were documented for these sites during the survey period, 2 reports of adult flatwoods salamanders were observed by other researchers as well as 1 report of gopher frogs calling at a different breeding site.

Pine Snake, Southern Hognose Snake and Mimic Glass Lizard Surveys were conducted at 4 sites--Webb Wildlife Center/Palachicola WMA, Tillman Sandridge and Lewis Ocean Bay Heritage Preserves and Hoover Plantation. Four pine snakes, 1 southern hognose snake and no mimic glass lizards were documented at these sites during the study period. An additional pine snake record was collected from another site in Hampton County as well as records for 3 mimic glass lizards in Jasper County.

The survey of Sandhills National Wildlife Refuge (SH NWR) and Sandhills State Forest, conducted by Dr. Jeff Camper, Francis Marion University, has yielded the first year completion report. This documents 70 species of amphibians and reptiles for the SH NWR, including 1 record for the pine snake.

The Eastern Diamondback Rattlesnake Population Ecology Project is being conducted at 3 sites in coastal areas: Donnelly WMA, Hoover Plantation and Webb Wildlife Center. PIT (passive integrated transponder) tags are being used to mark study animals and collection is accomplished primarily during the spring emergence from overwintering stumps. Private individuals as well as project partners contributed over 200 volunteer hours during the current field season. To date, a total of 26 rattlesnakes have been marked at the study sites with 1 recapture.

Five eastern diamondback rattlesnakes from Webb Wildlife Center have been surgically

implanted with radio transmitters. They were released on March 22, 1997 to track the animals through an 18-month study period. Currently, the study animals are tracked 3 times per week.

Longleaf Pine Ecosystem Survey---This is the sixth year of a cooperative effort between the Department of Defense and TNC/SC Heritage Program to identify high-quality stands of Longleaf Pine ecosystems. Perhaps the most significant result has been the discovery and documentation of Buffalo Creek Natural Area, which has the greatest concentration of rare species associated with the hillside herb bog plant community. This includes *Lysimachia asperifolia*, whorled loosestrife, which has not been collected in South Carolina in over one hundred years. In addition, the survey documented, for the first time, 2 species listed as endangered at the federal level, 5 species of federal concern and 12 species of state concern.

General Botanical Surveys---Discovery of *Gymnoderma lineare*, rock gnome lichen, was documented at Jones Gap State Park. This is one of only 2 lichen species listed under the Endangered Species Act.

An 18-month floristic survey to document rare and endangered plant species has begun for the Congaree Swamp National Monument. The project includes both the basic de novo survey and building a study collection to be housed at the visitor center.

Work continues on the SC GAP project to produce a vegetation layer for the state's biodiversity guide. Various types of remotely-sensed imagery are being correlated with known vegetation patterns along coastal counties to document and predict biogeographical resources as well as protection efforts.

RESOURCE MANAGEMENT

Red-cockaded Woodpecker---Major activities concentrated on monitoring the nesting population at Sand Hills State Forest and surveying both the Sandy Island location and Webb Wildlife Center, Santee Coastal Reserve and Tom Yawkey Wildlife Center location for current RCW groups and potential suitable habitat. Forty-four active RCW groups at Sand Hills State Forest were monitored for nesting activity out of the total 58 managed clusters. This was a 6% decline in active groups from 1996. The reason for this decline may be a higher incidence rate of *Glaucomys volans*, Southern Flying Squirrel, occupying RCW cavities, which was observed 1996-97 but has not been quantified yet. There were 33 nesting attempts, a 13% decrease from 1996, which resulted in 52 fledged chicks. Again, this decrease is possibly attributable to competition from secondary cavity users.

Four juvenile females were transferred to single male sites; however, observations indicated that the translocated females were not present with the males after 2 weeks. A total of 4 recruitment clusters were installed during the fall of 1996, consisting of 13 drilled cavities, 2 advanced drilled starts and 1 insert. Three out of the 4 clusters are in active RCW territories.

At Sandy Island, a demographic survey of cavity tree locations on 2,500 acres of suitable habitat, monitoring all active RCW groups during the 1997 breeding season and banding all nestling and adult RCW's was initiated in March. Eighty-three active cavity trees were located, painted and tagged. During the breeding season, 33 young from 15 nests were banded. Based on reproductive and other observations, there are 27 active and 4 inactive RCW clusters.

A survey of RCW clusters at the Webb Wildlife Center found 23 new cavity trees established since the last survey for a current total of 74 trees. There are 15 active groups. The Santee Coastal Reserve survey resulted in 6 new cavity trees for a total of 27 trees and 6 active groups. The Tom Yawkey Wildlife Center was also surveyed, which found 6 new cavity trees and 8 active groups.

Loggerhead Turtle---The 40-member volunteer South Carolina Sea Turtle Stranding and Salvage Network (STSSN) continues to provide valuable data on the temporal and spatial distribution of sea turtle carcasses that wash ashore. There have been 105 strandings to date in 1997. As in previous years, under the Emergency Response Plan of the National Marine Fisheries

Service (NMFS), the previous week's stranding totals were faxed each Monday to the Miami Fisheries Center.

A workshop was held at Fort Johnson Marine Resources Center for the leaders of the 16 volunteer nest protection projects. Eleven monthly aerial surveys were also conducted along the coast to find dead sea turtles and marine mammals on remote islands. *Loggerheadlines*, the stranding network's newsletter, is produced five times a season and distributed to network volunteers, other state and federal agencies and conservation organizations.

Staff also served on the Turtle Expert Working Group (TEWG), a twelve-member panel mandated by Congress and appointed by National Marine Fisheries Service (NMFS). Data continues to be compiled for a report to determine the incidental take level for fisheries-related mortality in addition to discussions concerning issues and methodology for a new genetics study of sea turtle carcasses.

Peregrine Falcon---For the eighth consecutive year, peregrine falcons have successfully raised young at the Table Rock Mountain eyrie. Four fledglings were produced this year.

HABITAT PROTECTION

The 1997 fiscal year was successful, having acquired five different properties totaling 3,755 acres. Four of the properties form new preserves and one property is an addition to an existing preserve. A total of \$1,966,414. Was spent on property acquisitions for an average total cost-per-acre of \$524. Property donated to the Heritage Trust Program was valued at \$1,057,000. Cash donations totaled \$9,549. These efforts served to protect 2 rare animal species, 9 rare plant species, 1 rare bird species, 6 rare plant communities and 2 important archaeological sites. A total of \$240,054. Was spent on capital improvements, contracts and preserve management activities. Revenues to the Heritage Trust Land Fund totaled \$1,943,358. And expenditures totaled \$2,206,468.

FY96-97 ACQUISITIONS

Property	Acres	Date Acquired	Total Cost
1. Segars HP -- Bowen	32	11- 4-96	\$ 92,807.
2. Fort Lamar HP	14	11-14-96	155,019.
3. Longleaf Pine HP	843	12- 5-96	581,961.
4. Laurel Fork HP	1,000	12-12-96	1,047,350.
5. Daws Island HP	1,866	1-10-97	89,277.
<hr/>			
TOTALS	3,755		\$1,966,414.

PRESERVE MANAGEMENT

Two volunteer workdays were held at Rock Hill Blackjacks HP and 1 workday at Forty Acre Rock HP.

Seven volunteer workdays days were held at upstate Heritage Preserves.

A total count of the federally endangered *Helonias bullata*, swamp pink, resulted in 419 plants of which 55 flowered. This marked the eighth year of monitoring this species.

In cooperation with The Nature Conservancy, populations of *Sarracenia jonesii* were counted and evaluated on Ashmore and Eva Russell Chandler HP's.

Nest boxes at Bunched Arrowhead and Chandler HP's were cleaned and repaired during the winter. Summer monitoring of the boxes resulted in a 49% occupancy rate--21 out of 41 boxes being used by wildlife.

Staff met with the U.S. Forest Service to discuss an interagency burn on, and adjacent to, Buzzard Roost HP. The proposed burn will be used as a management tool for Table Mountain pine and the federally endangered *Echinacea laevigata*, smooth coneflower.

Upstate staff cleared, repainted and posted the boundaries of Blackwell and Ashmore HP's, which resulted in the discovery of 2 previously unknown populations of *Xerophyllum asphodeloides*, turkeybeard on Ashmore HP.

An on-site meeting was held at Brasstown Creek HP between Georgia Power, the U.S. Army Corps and DNR staff to discuss erosion problems on the preserve and adjacent land. Personnel and volunteers closed illegal ATV trails and gated the road with the cooperation of all landowners.

Proscribed burns were conducted with the assistance of the SC Forestry Commission at 10 different Heritages Preserves for a total of 1,56 acres.

Work was done in cooperation with Wildlife Management personnel to mitigate erosion, erect gates, clear trails and wildlife viewing areas, post informational signs and boundary markers, assist with hunter problems and facilitate hunter access and other activities at various Heritage Preserves.

EDUCATION AND PUBLIC RELATIONS

During fiscal year 1996-97, outreach from the Wildlife Diversity Section included:

- 94 presentations given to the public;
- 1 public hearings conducted;
- 9 newspaper interviews given;
- 5 bird-banding demonstrations given;
- 2 press conferences held;
- 1 television interview;
- 1 radio interview;
- 9 interpretive field trips conducted at various Heritage Preserves;
- 1 featured segment for a midday television program

WILDLIFE ASSISTANCE

During fiscal year 1996-97, 4,186 calls for assistance or information concerning injured or nuisance wildlife were received, and approximately 50 individual permits for taking or possession of wildlife were issued. Major activities intended to reduce or respond to special problems included the following:

The thirty-eight member volunteer Marine Mammal Stranding Network consists of private citizens trained to gather data on dead stranded animals. Department personnel and veterinarians provide assistance to live stranded animals. During FY 1996-97, there were 43 strandings with the majority (28) being bottlenose dolphins. *Marine Mammal Matters*, the newsletter for the network, is produced twice a year.

The Bat Exclusion Referral List of Pest/Animal Control Operators was updated and sent to SCDNR offices, various SC DHEC office, Cooperative Extension Service office and city and county Animal Control offices.

The list of upstate wildlife rehabilitators was revised and distributed.

Identification of bats sent to SC DHEC for rabies testing continued.

Six adult and 4 immature Bald Eagles were recovered for rehabilitation at the South Carolina for Birds of Prey. To date, 6 of the total 10 have been successfully rehabilitated and released. Also, 4 adult and 2 immature Bald Eagles were recovered dead.

Work was done with the U.S. Coast Guard to reestablish operation of 3 different range lights during Osprey nesting season. Also, provided consultations with both SCE&G and the U.S. Navy concerning conflict mitigation between their respective facilities or personnel and nesting pairs of ospreys.

DATA SERVICES AND TECHNICAL GUIDANCE

Data Services---Approximately 525 data requests from the Heritage database of rare or threatened species and communities were serviced this year. Most requests come from environmental consultants but Wildlife Diversity staff, other government agencies and cooperating organizations, such as The Nature Conservancy, The Sierra Club and the Wilderness Society also submit requests.

Some data request highlights were:

- 1) Occupance data for the site of the Honda plant;
- 2) Occupance data for raptors for South Carolina Electric and Gas;
- 3) All occupance data for Jasper, Beaufort and Colleton counties for the Low Country COG;
- 4) Occupance data and species information for the Jocassee Gorges area for Clemson University.

Approximately 450 permits have been reviewed.

Approximately 100 element occurrence records (EORs) have been added to the Biological Conservation Data (BCD) system for a current total of ~7,100 EORs. This new data has come primarily from:

- 1) Bald eagle and wading bird nesting site updates--Tom Murphy and staff
- 2) Mary Strayer Bunch and Amy Sparano
- 3) Robin Roecker (U.S. Forest Service)

Technical Guidance---In cooperation with Duke Energy and the Museum of York County (MYC), SCDNR initiated formation of the Catawba River Naturalist Association to improve communications and information-sharing among local professional and amateur naturalists. An organizational meeting and subsequent field trip were attended by 40 and 10 participants respectively.

The staff botanist provided professional consultations to private resource managers for 14 different species or plant communities.

A staff biologist served as state coordinator for Partners In Flight, a national and international partnership of state and federal agencies, non-profit organizations and private industry promoting the conservation of migratory birds.

A staff biologist served on the Red-cockaded Woodpecker Recovery Team, headquartered in Atlanta, GA. The purpose of the Recovery Team is to update and rewrite the 1985 Recovery Plan. In addition, several meeting were held at the state level to discuss a "safe harbor" proposal for RCW's in South Carolina.

Several trips were made to the Anne Springs Close Greenway near Fort Mill providing wildlife management techniques and advice to the ranger. In addition, staff served on the Catawba River Task Force Implementation Committee.

Staff participated in a W.A.I.T (Wildlife and Industry Together) meeting at Duke Energy's World Of Power to educate employees and visitors about the benefits of management applications and to help them improve wildlife habitat.

Information about both Wood rat and New England cottontail habitat and recognizing distinguishing characteristics for identification of rabbits was provided to representatives from USFWS and NC Wildlife Commission during a site visit in South Carolina. In addition, peregrine falcon monitoring data was provided to USFWS.

Assistance was provided to interested landowners for improving nesting habitats and minimizing human disturbance at least tern roof nesting colonies.

PUBLICATIONS AND MAJOR PRESENTATIONS

Six scholarly publications were authored or co-authored by Wildlife Diversity personnel.

ENVIRONMENTAL SECTION

Habitat Conservation Coordination

Meaningful habitat conservation can be accomplished by thorough and consistent evaluation of development activities. Those activities having potential to impact fish and wildlife resources include wetland disturbance, water quality degradation, shoreline development, stream and reservoir dredging, water withdrawals, diversions, and impounding streams. To be effective in this endeavor requires a combination of field evaluations, desktop reviews, inter- and intra-agency coordination, policy development, and review of regulations and legislation. Action was taken on the following items to accomplish our objectives.

1. Review of Environmental Permits

Statewide coordination of environmental permits for the Wildlife and Freshwater Fisheries Division was provided by the Environmental Section. In FY 96-97 reviews of 645 permit applications were conducted, 183 of which were investigated and had comments issued. More emphasis was placed on nationwide permit reviews because of new, more restrictive regulations associated with these permits. In general, actions centered around wetland disturbances, endangered species, instream flow alterations, point source discharges and non-point source impacts. We developed management plans for three wetlands mitigation properties (Bucksport, Oliver and Black River tracts) associated with SC Department of Transportation projects.

2. Review of Environmental Legislation, Regulations and Policy Development

Significant environmental legislation and regulations were reviewed. Constructive comments were made to promote protection of fish and wildlife, and their habitats. We assisted in the review or development of State and DNR policy affecting fish and wildlife. Items on which action was taken include 1) the South Carolina State Water Plan, 2) Federal Energy Regulatory Commission (FERC) fisheries mitigation policy, 3) Savannah-Savannah Watershed Management Plan, 4) DNR Boat Ramp Construction Policy, 5) Greentree Reservoir Guidelines, 6) Reauthorization of the Section 404 Nationwide Permits, 7) Guidance for siting preservation mitigation banks and 8) the US Army Corps of Engineers' (USACE) Standard Operating Procedures for mitigation .

3. Inter and Intra Agency Coordination

Fish and wildlife habitat needs were represented at seminars, public meetings, and regulatory proceedings. Efforts were coordinated with state and federal agencies including SC Department of Health and Environmental Control, Sea Grant Consortium, US Fish and Wildlife Service, US Environmental Protection Agency, USACE, US Geological Survey, National Marine Fisheries Service, National Resource Conservation Service, and Georgia Department of Natural Resources. Environmental Section staff met with Water Resources, Land Resources and Conservation Districts and Marine Resources divisions, and Executive Office staffs regularly to discuss environmental permits, issues and policies.

4. Wetland Mitigation Planning

A work plan was developed for the Peter's Creek Mitigation Project. This project involves purchasing a 200-acre tract and restoring the reach of Peter's Creek that crosses the property. This project is being used to offset impacts to Piedmont streams. A mitigation plan was also developed and implemented to compensate for wetlands impacts to the Waccamaw River floodplain resulting from public boat ramp construction.

Index of Biotic Integrity Studies

A technical presentation *Using an Index of Biotic Integrity to Assess Gold Mine Impacts on Streams* was made at the 50th Annual Conference of the Southeastern Association of Fish and Wildlife Agencies. The final manuscript was completed and submitted for publication in the conference proceedings.

Hydropower Coordination

The FERC licenses approximately 40 hydroelectric projects throughout the state. The USACE operates four large hydroelectric projects and a fifth non-power producing dam. The Environmental Section has used its role in the FERC licensing process to make recommendations for license provisions needed to protect, enhance, or mitigate damages to fish and wildlife associated with operation of these projects. Recommendations were also made for recreational access and facilities needed at these projects. For USACE projects, the Section was involved in issues related to fish entrainment, fish passage, and water quality.

1. FERC Hydroelectric Projects

The Section coordinated the DNR's involvement with 25 FERC-licensed hydros during FY 96-97. We assisted with and approved study designs, inspected field activities, interpreted study results, and made recommendations to applicants and the FERC based on these studies. Input was solicited from Freshwater Fisheries, Wildlife Diversity and Wildlife Management Section biologists and other DNR divisions. Field work was mainly conducted by project operators or their consultants. The results of our efforts follow.

A. Instream Flow

Minimum instream flows were initiated at the Gaston Shoals hydro establishing continuous flows in a 1.1 mile shoal of the Broad River for the first time in over a half century. At the Buzzards Roost hydro, the one-year trial period for compliance with new minimum flows ended June 18, 1997. Compliance is now mandatory assuring this 15-mile length of the Saluda River will have adequate water for navigation and fisheries habitat. Plans and schedules were finalized for channel modifications to prevent walleye strandings and for starting minimum flow releases for the Tugaloo River below Lake Yonah. Implementation will be during FY 97-98.

B. Fish Entrainment and Mortality

Fisheries Resource Enhancement Plans were submitted to the FERC for Neal Shoals, Ninety-Nine Islands, and Gaston Shoals hydros on the Broad River; and Stevens Creek and Abbeville hydros in the Savannah drainage. These documents represent the DNR's recommendations to the FERC for mitigating fish mortalities associated with project operation. Agreement was reached with Duke Power Company for their Gaston Shoals, Ninety-Nine Islands and Buzzards Roost hydros, and with South Carolina Electric and Gas Company for their Neal Shoals hydro concerning the value of fish killed by entrainment.

C. Water Quality

Installation of an oxygenation system at the Buzzards Roost hydro was completed. The system assures oxygen concentrations of project discharges are adequate for fisheries resources. Installation of turbine-venting pipes began at the Saluda (Lake Murray) hydro in an effort to improve oxygen concentration of project discharges.

D. Recreation Access and Facilities

Final construction plans for enhanced recreational access at the Buzzards Roost, Gaston Shoals, Ninety-Nine Islands and Stevens Creek projects were reviewed and commented to. Enhancements include four new or improved boat ramps, three canoe portage or launching areas, three barrier-free fishing access sites, four angler trails, and nine new or improved parking areas. Construction of many of these items should be completed in FY 97-98.

2. USACE Projects

The Section had involvement at all five USACE projects during FY 96-97. Considerable effort was directed toward the Richard B. Russell Dam and New Savannah Bluff Lock and Dam, both on the Savannah River.

A. Russell Dam Pump Storage Project

We completed our participation in court-approved environmental studies being conducted by the USACE to evaluate fish entrainment and mortality, water quality effects and recreational

angling impacts associated with the operation of four, new reversible turbines. We also reviewed and commented to the draft final report. Results indicated that more than 10 million fish would be killed by project operation during an average water year. Species affected include threadfin shad, blueback herring, striped and hybrid bass, yellow and white perch, and black crappie. Water quality effects of simulated commercial operation were shown to warm downstream waters, reducing or possibly eliminating habitat for striped and hybrid bass in the headwaters of Lake Thurmond. Angler harvest rates from the headwaters of Lake Thurmond were significantly lower than of all years previously sampled. A final report is to be issued in FY 97-98.

B. New Savannah Bluff Lock and Dam

For the second year we coordinated flow releases from the USACE's upstream reservoir to provide fish passage at this dam for spawning American shad. The project's navigation lock, historically used to provide fish passage, has not been operational since late 1995. Sampling indicated that shad passage occurred from March through May 1997 during both planned and unplanned high flow events.

Natural Resource Damage Assessment

The Section coordinated the Division's involvement in the NRDA resulting from the June 1996 oil spill into the Reedy River. All activities were under the guidance of the DNR's Executive Office. We conducted reconnaissance studies, assisted with and approved study designs, inspected field activities and interpreted study results. Input was solicited from Freshwater Fisheries, Wildlife Diversity and Wildlife Management Section biologists, Clemson University and others. Field work was mainly conducted by Colonial Oil Company and its consultants.



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